Multilateral restrictions on industrial policy: the impact of eliminating local content requirements in the automotive sector

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ABSTRACT

This thesis concerns the role of the state in industrial development and structural transformation, in the context of multilateral restrictions on trade and investment policy space. More specifically, it examines the elimination of local content requirements (LCRs) in the automotive sector by 16 developing countries, as required by the WTO's Agreement on Trade-Related Investment Measures. My focus is on the complex, dynamic causal processes that govern the economic geography of production, trade and investment, and the implications of the elimination of LCRs on those processes.

In order to explore this issue, I employ a mixed method approach to empirical impact evaluation. I examine how the elimination of LCRs has impacted a number of key variables relating to production, trade and investment, using two methodological tools: 'difference-in-difference' panel regression, and comparative case studies. Possibilities for empirical research emerged from a 'natural experiment' – in which a number of countries were exogenously compelled to remove LCRs – coupled with the passing of sufficient time to allow long term impacts to be realised. This mixed approach entails progression from a simple panel regression model aimed at identifying and quantifying the 'global' impacts of the policy restriction on the 16 countries subject to the elimination of LCRs, to a more expansive treatment of the complex factors that determine case-specific outcomes, and the mechanisms through which they operate, through historical institutionalist, comparative case studies.

The key finding is that contrary to the more pessimistic expectations, liberalising countries appear, on balance, to have exhibited significantly improved industrial performance outcomes: controlling for relevant covariates, output levels have not fallen while exports have increased dramatically. However, the cases examined here had a number of strong advantages going into liberalisation, suggesting that positive outcomes may not be broadly generalisable. The benefits of integration into global networks are unevenly distributed across structurally diverse countries, while across the cases examined here, countries continue to pursue alternative means through which to promote domestic production, the effects of which are difficult to separate from wider processes of liberalisation and developments in the structure of global value chains.

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1 INTRODUCTION

1.1 STATEMENT OF RESEARCH PROBLEM

This thesis concerns contemporary debates on the role of the state in industrial development and structural transformation, in the empirical context of developing countries' automotive sectors. More specifically, I examine the impact of restrictions on a particular type of investment performance requirement, imposed through the Agreement on Trade-Related Investment Measures (TRIMs Agreement) under the auspices of the World Trade Organisation (WTO), which prohibits local content requirements (LCRs). The purpose of LCRs is to constrain the activities of manufacturing firms with respect to intermediate input sourcing; historically they have been used most prominently in the automotive sector to encourage the establishment of 'linkages' between multinational vehicle assemblers and local suppliers of parts and components. The TRIMs Agreement has necessitated the elimination of such policies for all WTO members in which they were in force, within an externally imposed timescale.

My research problem relates to the implications of the elimination of LCRs for industrial development; specifically, whether the elimination of LCRs has had significant, discernible effects on countries in which they were previously in force, and the nature of these effects, including whether they have varied between countries with different structural characteristics. This involves cross-national empirical comparison of industrial performance outcomes, and the causal mechanisms through which outcomes arise, as they have unfolded over the course of the elimination of LCRs. Before turning to my empirical strategy, I first discuss my motivations for carrying out this research. I then provide a brief overview of the background to debates around multilateral trade liberalisation and policy space. Having done so, I provide an overview of my research design and method, summarise my key findings, and then describe the structure of the remaining chapters of the thesis.

1.2 MOTIVATIONS FOR RESEARCH

The developmental implications of restrictions on LCRs are extremely contentious, with numerous arguments for and against. The core concerns are reflected in wider debates on interventionist trade and industrial policies and the developmental impacts of multilateral restrictions on 'policy space', to which I intend to contribute. The role of the state in industrial development is an immensely complex and contested issue which, at risk of over-simplification, can be characterised by two opposing perspectives: *neoliberalism* assumes that markets are generally efficient and that state interventions are likely to exacerbate distortions rather than correct them while *structuralism* assumes that market failures are pervasive and that the state can effectively intervene to improve welfare outcomes. These perspectives suggest opposing policy stances on the part of developing countries, with the former recommending a 'neutral' regime allowing the market forces of comparative advantage to reign free, and the latter a pragmatic combination of trade restrictions, investment performance requirements and other forms of industrial promotion targeted at specific activities in which market failures are seen to reside.

In the context of these divergence perspectives on the value and effectiveness of government intervention, a large number of scholars (Chang, 2002; Wade, 2003; Lall, 2004; Gallagher (ed.), 2005; Hamwey, 2005; Dicaprio and Gallaher 2006, UNCTAD 2006, Kumar and Gallagher, 2007;

Akyüz, 2009) have expressed concern that policy restrictions are reducing developing countries' policy space in important ways.

While the effects of policy restrictions emanating from the lending practices of the international financial institutions (IFIs) and regional and bilateral trade and investment agreements may be extremely significant (Shadlen, 2005; Akyüz, 2007), multilateral trade rules are particularly interesting and important for several reasons. Unlike the lending practices of IFIs, multilateral rules are legally binding for all participants, albeit subject to some additional provisions for developing and least developed countries, which have arguably been fairly limited in scope; and they cover the vast majority of national economies in a common framework, unlike bilateral and regional agreements. This allows me to examine how the extent to which uniform restrictions vary across countries with different structural characteristics, which is an important concern of the thesis.

My thesis comprises an empirical investigation into the validity of the structuralist concerns that is both substantively interesting and methodologically feasible. LCRs were a highly contentious topic within multilateral trade negotiations, and developing countries strongly resisted their prohibition in favour of continued flexibility to condition the activities of multinational corporations operating within their territories. However, the policies can also have distortive and damaging effects. Theoretically, the impacts of LCRs are ambiguous, and depend on numerous contextual factors relating to market structures and the presence of market failures in technological learning and technology transfer. Empirically, both positive and negative aspects of LCRs have been reported in the literature. In summary, the overall developmental implications of the prohibition of LCRs are ambiguous; there is a lack of systematic, cross-national empirical research, a gap which this thesis aims to fill.

This debate has significant 'real-world' policy implications, as the international institutions that govern economic life hinge upon conclusions drawn in the academy. In such a context, the findings from my research may be more generally applicable to other policy instruments and other areas of multilateral, regional and bilateral negotiation. Although the policy instrument examined in this thesis has already been prohibited by the WTO, further negotiations on multilateral trade rules are ongoing, a more comprehensive regime on finance and investment is being mooted, and bilateral and regional agreements and institutions proliferate apace. In addition, this research coincides with a turn, among prominent institutions such as the World Bank, towards greater acceptance of an enhanced role for the state. As such, the issue of the impact of multilateral restrictions is both vital to the issues of global equality and justice, and of contemporary academic significance.

An important factor motivating my interest in this area of research is methodological. Analysis of the implications of the elimination of LCRs is complicated by causal complexity. Industrial performance outcomes are naturally codetermined by numerous factors other than LCRs, which need to be adequately controlled or otherwise accounted for. Policies are likely to give rise to heterogeneous effects, depending upon their conjunction with wider contextual factors. Furthermore, the rationales for trade and industrial policies such as LCRs are that they give rise to non-linear, cumulative effects, the determination of which requires a dynamic framework of analysis. Decisions to implement and remove LCRs are likely to be 'endogenous' to the industrial performance outcomes on which they exert an effect. In this context, there are considerable difficulties isolating the impacts of policy changes; some scholars have even commented that the costs of policy space restrictions are impossible to quantify. However, the extension of multilateral rules of specific policy instruments that has occurred through the WTO (an

'exogenous' shock) provides an interesting opportunity for evaluating the impact of restrictions across a number of countries, using both variable- and case-oriented approaches to causal attribution. The contributions of each methodological approach to causal complexity, and the benefits of triangulating findings, justify my mixed-method research design, on which I elaborate presently.

1.3 BACKGROUND: THE POLICY SPACE DEBATE

WTO commitments certainly reduce *de jure* policy space, since they undoubtedly limit the legal autonomy of states to pursue certain development strategies, but policy space is more than just legal autonomy; it refers to "the effectiveness of national policy instruments in achieving national policy objectives" (Akyüz, 2007: 3).

In the structuralist perspective barriers to structural transformation may be so pervasive that in the absence of policies aimed at overcoming them, industrial development is bound to stall. Mastery of new activities – especially those that are technologically advanced – is subject to costly and uncertain learning processes and interdependencies between firms, giving rise to infant industrial arguments. The argument is that "rules and commitments, which in *legal* terms are equally binding for all countries, in *economic* terms might impose more binding constraints on developing than on developed countries, because of the differences in their respective structural features and levels of industrial development" (UNCTAD, 2006: XII). These structural features include the extent of market failures which potentially justify the restricted policies in the first place. If the multilateral restrictions prevent countries from pursuing developmentally useful interventions, then they may impose costs; the overall impact on *de facto* policy space is ambiguous.

In contrast, neoliberals would argue that the *de facto* impact of trade policy restrictions is always to enhance policy space for development. This is so for two main reasons, relating to the main theoretical presuppositions of neoliberalism: that market failures are relatively insignificant in magnitude, and that even when market failures do arise, state intervention usually makes matters worse. If markets are efficient, i.e. there are no market failures, it can be demonstrated that free trade is unambiguously welfare enhancing, following the theory of comparative advantage[1]. In addition, to the extent that market failures reside in technological and capital markets, neoliberals tend to argue that these can be largely overcome through openness to foreign capital and technology in the form of FDI (Pack and Saggi, 2006).

[1] As a result of the elimination of trade barriers, resources will flow from import-competing sectors in which countries have a comparative disadvantage, to export sectors in which they have comparative advantage (WTO, 2008; Lin and Monga, 2010). It can be shown, under stringent assumptions of market efficiency and that are employed by mainstream static trade models, that trade liberalisation is unambiguously beneficial for all participants (e.g., Brown et al., 1995, 2002; World Bank, 1995; Francois et al., 1996, 2005). In this perspective, restrictions on trade policy are not a 'cost' in real economics; all concessions that countries make contribute to welfare improvements. "The effect of trade liberalization is to increase real GDP at world prices" (WTO, 2008: 64); and, more importantly, all countries gain. Liberalisation is even more beneficial for poorer countries with higher initial levels of protection; "countries that liberalize the most tend to gain the most. Indeed, in the literature, there is a strong positive relationship between own liberalization and estimated welfare gains" from liberalisation (Francois et al., 1996). The assumptions introduced as parameters in such models, and by extension their findings, have been robustly challenged by critics (e.g. Taylor and von Arnim, 2006; Wise and Gallagher, 2006; Kirkpatrick and Scrieciu, 2007). While some of the issues can in principle be addressed with modifications to the specifications and assumptions adopted, there remains a fundamental limitation in that "structural adjustment is a dynamic problem that is difficult to capture with static models" (De Cordoba et al., 2005: 67).

In the structuralist view, while FDI can help to overcome capability deficits, attracting and benefitting from FDI is far from easy, and requires the presence of local capabilities in the first place, since "technology-intensive and knowledge-augmenting investment flows seek out complementary assets in the recipient countries" (Narula and Dunning, 2000: 158). FDI can also give rise to a number of negative impacts arising from imperfect competition and the strategic behaviour of MNCs. Among the most important determinants of the developmental impacts of FDI are the extent to which MNCs transfer technology to subsidiaries and otherwise engage in linkages with the wider economy. Because these processes may be subject to market failures, the presence of FDI does not negate a role for the state in conditioning the operational behaviour of MNCs, such as through the use of policies such as LCRs.

Therefore, to the extent that such market failures are accepted, neoliberals complement their welfare economic foundations with some political economy premises about the capabilities and motivations of states in practicing effective interventions (Chang, 2000). Such arguments are twofold, and relate to *information* and *incentives.* With respect to information, it is argued that states do not have the capacities to identify accurately the incidence and magnitude of market failures. Better to let the decentralised market mechanism to identify profitable opportunities than expect bureaucrats to 'pick winners'. This argument is typified by Krugman (1983), Krueger (1990) and Pack and Saggi (2006). With respect to incentives, it is argued that conferring 'rents' alters the behaviour of economic agents. Firms engage in 'rent-seeking' activities, devoting efforts to securing government support rather than pursuing productivity improvements; there a danger that "once they are awarded the state-created rents, investors may have little incentive to raise productivity, as the market mechanism has been temporarily weakened" (Chang, 2006: 28) – giving rise to 'infants that never grow up'.

Most proponents of state intervention acknowledge the general validity of these concerns (e.g. Gallagher and Kumar, 2007). However, they emphasise case study evidence on newly industrialised developmental states (see Amsden, 1989 on Korea; Wade, 1990 on Taiwan) and specific policies targeted at market failures residing in technological capability accumulation (e.g. see Chang, 2005 on trade policy; Chang and Green, 2003 on investment restrictions and requirements; UNCTAD 2003b on technology policies) to show that industrial policies need not be damaging, and indeed have been highly successful in certain instances. Successes are less celebrated outside of East Asia, but numerous nevertheless; indeed as Rodrik (2004: 27) illustrates, "it is difficult to come up with any real winners in the developing world that are not a product of industrial policies of some sort". Furthermore, as Chang (2002) convincingly demonstrates, even today's high-income industrialised countries used a raft of interventionist measures to catch up with past technological leaders. As a result, structuralists have tended to see intervention as a necessary but insufficient condition for industrialisation in the developing world. For them, "past policy failure is not a reason for passive reliance on deficient markets but for improving government capabilities" (Lall, 2004: 2). Instead, they ask how some states have managed to intervene so much more successfully than others, in order to maximise the benefits of their integration into the global economy. In this regard, structuralists deviate substantially from the policy recommendations of neoliberals. Structuralists acknowledge the role of international integration in development strategies – especially through access to foreign markets – but argue that the impacts of liberalisation are systematically different for countries at different stages of development, and can potentially exacerbate processes of cumulative causation that disproportionately favour advantageous locations and 'freeze' economies into their existing comparative advantage. As a result, developing countries require additional flexibilities within international agreements in order to mitigate adjustment costs and pursue developmentally useful policies.

1.3.1 The rationale for multilateral trade restrictions

If the exploitation of comparative advantage were unambiguously beneficial, states could implement liberalisation unilaterally; we need to recognise additional justifications for multilateral policy restrictions. These benefits relate to the underlying principle of the WTO: that members commit to liberalise their trade regimes in return for reciprocal commitments by others. Therefore, in instances when states are faced with incentives to apply trade protection unilaterally – either because protection may enhance their overall welfare or because they are subject to political economy pressures to maintain protection even when it is welfare-reducing – multilateral liberalisation may be preferable to unilateral liberalisation. As a result, as Milner (2009: 128) points out:

> By lowering tariff and non-tariff import barriers or constraining the use of contingent protection instruments in export markets, WTO membership seeks to increase the scope and effectiveness of developing countries' own reforms aimed at promoting exports.

Firstly, mainstream trade theorists accept two instances in which trade protection may be welfare enhancing for the country applying protection, although these instances are deemed to occur fairly infrequently. Bagwell and Staiger (1999) propose a theory of trade negotiation in which trade protection may be subject to a 'terms of trade' externality for large economies. In the presence of such an externality, protection is inefficient from a global perspective, but some of the costs are shifted to foreign exporters, who receive a lower price for their goods. "This temptation to shift costs naturally leads governments to set unilateral tariffs that are higher than would be efficient" (ibid.: 216). Multilateral trade liberalisation is therefore a way of overcoming a 'prisoner's dilemma' through legally binding commitments: "It is in each country's interest to impose restrictions", but in the absence of agreement, all countries "end up in a situation where their welfare is lower than if they applied free trade policies" (Hockman and Kostecki, 2001: 26). This outcome is important because it acknowledges the potential for domestic-welfare-enhancing trade policies while maintaining the justification for liberalisation. A similar finding emerges in the context of strategic trade arguments (discussed below). As Brander (1995: 66) notes, while strategic trade policy concerns generate "unilateral incentives for intervention… Even nationally successful strategic trade policies typically have a beggar-thy-neighbour aspect".

Secondly, WTO commitments serve as a 'golden straightjacket', a device for committing to good policies and providing insulation against domestic protectionist lobbies. According to the static version of the theory of comparative advantage which underpins neoclassical trade theory, the overall effects of liberalisation are unambiguously positive, as described above. The foundations of this conclusion are questionable, as I discuss presently; in any case, assuming that net benefits accrue to the liberalising country, there will still be some losers from liberalisation among import-substituting industries. With unilateral liberalisation, the benefits fall to consumers, a large and diffuse group, while the costs fall on relatively concentrated and more easily organised import-competing sectors. Consumers are unlikely to have sufficient incentive to organise coalitions and lobby government to reduce protection. In contrast, when liberalisation takes place in a reciprocal setting, benefits accrue to another relatively concentrated and well-organised group of potential exporters, who are able to more effectively balance the lobbying influence of the import-competing sectors (Finger et al., 1999). Therefore, engagement in multilateral liberalisation tends to result in better domestic policies than may occur otherwise.

This means that the impact of domestic policy restrictions must be weighed against the potential benefits of increased market access and the curtailment of 'beggar-thy-neighbour' policies abroad. The overall impact of multilateral rules on policy space is ambiguous: participants in multilateral trade liberalisation are subject to effects arising from their own liberalisation (equivalently 'concessions' or 'commitments'), but also – and this is the rationale for multilateral rather than unilateral liberalisation – arising from increased market access opportunities for

exporters as a result of liberalisation abroad. The overall developmental impact of multilateral restrictions for each country thus depends on the substantive details of the concessions given and received.

1.3.2 Adjustment costs and arguments in favour of deviations from free trade

There should be no presumption that concessions given and received are equally distributed among participants in multilateral liberalisation. Concessions are also unevenly distributed across sectors, with those in which developing countries tend to specialise subject to fewer and less extensive commitments. Indeed, numerous accounts of negotiations in the Uruguay Round and subsequently have pointed to significant inequalities with respect to the distribution of concessions (Finger and Nogués, 2002). The TRIMs Agreement has had asymmetric effects in the sense that the prohibited policies, including LCRs, were only in force in a subset of countries, while all WTO member can potentially benefit from enhanced access to the newly liberalised markets.

Furthermore, assuming that concessions are equivalent in magnitude (to the extent that such can be demonstrated, which is not straightforward), and assuming that the net effects are positive for each participant, this does not imply they are equal in their effects. In fact, there is no absolute certainty that the net effects of multilateral liberalisation are positive for all participants, since there may be significant costs associated with the process. The relative magnitude of both costs and benefits depends on the structural characteristics of individual countries in two respects: firstly, in terms of countries' capacities to mitigate or absorb adjustment costs arising from their own commitments and (adjustment capacities) and benefit from foreign commitments through the expansion of exports (supply capacities); and secondly, in terms of the extent to which deviations from comparative advantage are necessary in order to promote activities with greater developmental value.

It is well recognised that multilateral liberalisation has given rise to significant short and medium term adjustment costs[2] (Bacchetta and Jansen, 2003; De Cordoba et al., 2005) and that capacities to mobilise resources towards exports and thus benefit from increased market access abroad are highly uneven (UNCTAD, 2005). The structural features that determine the costs and benefits of multilateral liberalisation is beneficial are likely to include, *inter alia*, labour market institutions (i.e. education and training), social safety nets, financial markets, transportation and utilities infrastructure, and macroeconomic fundamentals, all of which tend to be deficient in developing countries. Importantly, technological and innovative capabilities at the firm and national levels are also important in adjusting to competitive pressures, especially in valuable high-tech industrial activities, and are likely to be subject to profound market failures, as discussed in chapter 2 from the technological capability perspective.

[2] De Cordoba et al. (2005) define adjustment costs as costs of transferring resources from one sector to another, which may be incurred by private and public agents (p. 59). As Bacchetta and Jansen (2003) discuss, adjustment costs arise as a result of a wide range of economic phenomena, such as shifts in commodity prices, technological change, and policy factors such as trade liberalisation; in the case of the latter, adjustment costs arise in "industries in which foreign competitors are more efficient than domestic producers. When import barriers on the products of those industries are lowered, the foreign producers will be able to attract domestic consumers with lower prices. Domestic import competing firms in those markets will face downward pressures on sales and profits, which in turn can lead to pressure for lower wages, job losses and perhaps even company closures". De Cordoba et al. (2005) distinguish privately-incurred costs that are related to the productive factors of labour (e.g. opportunity cost of unemployed labour; obsolescence of skills; retraining costs) and capital (e.g. opportunity cost of under-utilised capital; transition costs of converting capital to alternative productive uses). Examples of costs borne by the public sector include the costs of shifting the tax revenue base; social safety net spending; the implementation costs of trade reform; and the costs of efforts to ensure macroeconomic stability.

Concerns about adjustment to the liberalised environment do not challenge the notion that multilateral trade policy restrictions enhance welfare in the long term, but rather raise questions about how quickly net benefits are accrued and how they are distributed among participants. They also raise some important questions regarding the manner in which liberalisation should proceed, and the policies and institutions which should be implemented and established in conjunction with liberalisation. There is consensus that issues of timing and sequencing are crucially important, as are safeguards and 'special and differential' provisions for developing countries.

From the structuralist perspective, the presumption that trade liberalisation may only enhance national welfare is extremely simplistic and flawed. Adjustment costs may be far from negligible. Trade liberalisation may lead to imports expanding much faster than exports, giving rise to balance of payments difficulties and widespread unemployment. Through a vicious cycle of macroeconomic effects, the long term result of liberalisation can feasibly be lower levels of growth.

Therefore, central contention of the structuralist perspective is that rapid liberalisation may give rise to vicious or virtuous circles of cumulative causation, depending on existing capabilities at the time of liberalisation:

> Given existing biases and asymmetries in international economic relations, moves towards a more open and integrated economic space are just as likely to reinforce as they are to diminish the gaps between developed and developing countries. In particular, the capacity to respond to liberalization favours the already developed countries, which, because of first-mover advantages, economies of scale and learning capabilities, are able to acquire and reinforce dominant positions in developing country markets (Kozul-Wright and Rayment, 2004: 4).

There is tendency for the sectors in which developing countries have comparative advantage to exhibit declining terms of trade. In the early conceptions of the infant industrial arguments, such effects were associated with dependency upon standardised 'commodities'. However, according to such theories, declining terms of trade are associated with any sectors in which barriers to entry are low. This leads to a 'fallacy of composition' in which specialisation in standardised, labour- and resource-intensive manufactures may have limited value added potential to the extent that many others simultaneously do the same. In contrast, technologically-advanced activities are associated with higher productivity but may be subject to two types of positive externality – dynamic learning externalities, technical externalities or 'learning by doing' within firms; and positive spillovers between firms and the wider economy. Thus, "specializing in some products will bring higher growth than specializing in others. In this setting, government policy has a potentially important positive role to play in shaping the production structure, assuming of course that it is appropriately targeted on the market failure in question" (Hausmann et al., 2007). Furthermore, the nature of existing industrial structures determines the potential for 'linkages' between related activities; this corresponds to Wade's concept of an "internally integrated" economy as one with a "dense set of input–output linkages between sectors" (2003: 635). Importantly, following comparative advantage with no concern for the potential for linkages may result in specialisation in activities which limit the prospects for further diversification and upgrading (Hausmann and Rodrik, 2006). These ideas form the basis of justifications for LCRs, which are explored in greater depth in the next chapter.

1.4 EMPIRICAL CONTEXT: THE TRIMS AGREEMENT AND THE ELIMINATION OF LCRS IN THE AUTOMOTIVE SECTOR

1.4.1 The TRIMs Agreement and the prohibition of LCRs

The inclusion of TRIMs was one of the most controversial areas of negotiation in the Uruguay Round, with marked division between developed and developing countries (Croome, 1995). Developing countries were almost unanimous in opposition, defending their right to condition the entry and activities of foreign investors as non-negotiable, and considering it "important to maintain flexibility in their economic and development policies" (UNCTAD, 2000: 235).

In the end, the Agreement achieved a fairly modest aim compared with some early proposals – which, including issues relating to entry, ownership, and non-trade operational issues like technology transfer – were "energetically resisted" (Low and Subramanian, 1995: 421). It covers a narrow subset of performance requirements, those pertaining explicitly to trade: discriminatory trade practices may not be imposed upon foreign investors as a condition of their market entry, regardless of whether they are mandatory or related to incentives.

The illustrative list of TRIMs prohibited by the Agreement includes LCRs, trade balancing requirements and foreign exchange restrictions, as well as a number of similar but less familiar instruments (appendix 1). The effects of all TRIMs are assumed to be distortive without any requirement for positive proof. Article 5 of the Agreement specifies that prohibited TRIMs must be removed within a transition period of two years for developed countries, five years for developing countries, and 7 years for least developed countries. Members were required to notify full details of all TRIMs, and not to impose any new measures in the transition period.

Criticism of and resistance to the TRIMs Agreement emerged based on a number of factors, relating both to short-term difficulties in adjustment and TRIMs' long term developmental value. With respect to adjustment costs (discussed above), countries have argued that local firms need more time to adjust more gradually to liberalisation[3]. Notwithstanding the potential long-term value of global restrictions,

> In the short term, the elimination of some (TRIMs) may throw firms and employees in industries into an unsustainable position, possibly leading to economic disarray… To minimize the impact of such disruptions, a host country might want to establish a phase-out period and schedule for such domestic content requirements (UNCTAD, 2001a: 61).

These concerns have been acknowledged in additional time scales for the removal of restricted policies. Developing countries were initially granted until 2000 to remove restricted TRIMs, and

[3] In the context of the present thesis, it would be valuable to explore these costs in greater detail, but in light of the multiplicity of factors contributing to structural adjustment, there are profound methodological difficulties in attributing adjustment costs to specific factors such as trade reform; a summary of the methodological issues associated with causal attribution in general is provided in chapter 4, while De Cordoba et al. (2005) discuss the issues in relation to adjustment costs more specifically. As the authors observe, one of the most significant difficulties pertains to the availability of reliable data aggregated at the national level and detailed at the appropriate sectoral level. The applied empirical literature has usually focused on unemployment, the largest and most 'visible' type of adjustment cost; these studies are reviewed in Bacchetta and Jansen (2003: 17-18). While UNIDO (2011b) provide data on employment and wage rates by industrial sector, they are largely incomplete, and insufficient for the purposes of the cross-national quantitative and comparative case study analyses employed in this thesis. Instead, data on production, trade and investment patterns – which relate less directly to adjustment costs – are brought to bear in both stages of the empirical analysis, as discussed in chapters 4 to 6.

least-developed countries until 2002. In addition several countries have requested and were granted extensions to these deadlines, as discussed in chapter 3. Nevertheless, according to Wade (2003: 628),

> The time period has to do with administrative and legal handicaps in getting up to speed on TRIMS enforcement. It has nothing to do with the time needed to nurture infant industries, nothing to do with competitiveness. In this fundamental respect the TRIMS agreement narrows the scope of 'special and differential treatment' allowable for developing countries.

Under such circumstances, the implications of Wade's statement is that the prohibition of tools such as LCRs may have profound developmental implications for infant parts and components suppliers nurtured by local content requirements, and for the future capacities of countries to "to constrain the choices of companies operating in their territory" (Wade, 2003: 621) in ways that may be developmentally beneficial. Bello (2003: 16) has gone so far as to claim that in light of reliance of developing countries on FDI, the TRIMs agreement "practically eliminates the use of trade policy for national industrial development". In the light of structuralist concerns about policy space restrictions, the prohibition of LCRs may have led, *ceteris paribus*, to further polarisation of industrial performance according to a process of 'cumulative causation': the proverbial 'kicking away the ladder'.

1.4.2 The elimination of LCRs in the automotive sector

A number of studies conducted prior to and during the course of the Uruguay Round negotiations confirm the high incidence of TRIMs, although with widely varying methods and findings (UNCTC, 1991). With respect to incidence of specific instruments, LCRs were by far the most prevalent, with about three quarters of developing countries and a third of developed countries sampled adopting them. In terms of sectoral incidence, the automotive sector has been most affected, followed by electronics and chemicals. The elimination of LCRs in the automotive sector provides an appropriate empirical context in which to examine debates around policy space restrictions for several reasons. Firstly, it is a high-tech sector dominated by large multinational firms, thus potentially exhibiting the types of market failures which give rise to structuralist arguments in favour of interventionist trade and industrial policies. Secondly, the use of automotive LCRs has been ubiquitous across the world, but especially in developing countries, to support the integration of intermediate suppliers and assemblers, suggesting that their developmental effects are certainly an important concern. Thirdly, conducting a 'global' comparative policy analysis is facilitated by the provisions of the TRIMs Agreement, which ensure that relevant policies are notified; in the absence of such provisions, compiling an exhaustive record of policy legislation would be prohibitively onerous. Thus, I am able to identify 16 countries which have recently eliminated automotive LCRs as a response to the TRIMs Agreement, thus enabling the systematic, cross-national comparison of outcomes across a large group of countries with quantitative statistical techniques. Fourthly, there is a large literature on the determinants of automotive sector development which I am able to draw on to inform the operationalisation of the key variables in my analysis – parts and component sector performance outcomes at the national level, and the complex causal conditions that determine them through the mechanisms of global value chain governance – in order to isolate the specific implications of the policy change under examination.

1.5 RESEARCH QUESTIONS, RESEARCH DESIGN AND METHOD

My review of the literature on the use of LCRs suggested that effects on industrial performance outcomes are complex and ambiguous, and depend on a number of contextual factors relating to the conditions under and the manner in which they are implemented.

In reviewing the methods through which the effects of policy changes can be examined, I note that there are two broad empirical approaches to complexity: variable- and case-oriented research methods. The basic problem facing researchers in the context of causal complexity is that the counterfactual, what would have happened in the absence of the phenomenon under examination, cannot be observed. Variable- and case-oriented methods have different strengths for addressing different types of research question, justifying my decision to employ a 'nested' mixed method approach, in which the findings of panel regression built on and were complemented by a series of comparative, historical institutionalist case studies.

Generally speaking, by exploiting the statistical properties of large numbers of observations when variables can be adequately quantified, variable-oriented methods are more capable of isolating the contribution of individual variables to outcomes, thus enabling generalisation about their average effects. This relates to my first research question, which addresses the issue of the nature and magnitude of the impacts of the elimination of LCRs within the countries in which they were previously in force by comparing changes in industrial performance outcomes in relation to a 'control group', according to the 'difference-in-difference' approach. As mentioned previously, this approach was enabled by the natural experiment presented by the exogenous restriction of the elimination of LCRs, and by the availability of data on the use of LCRs in the automotive sector which facilitated the construction of a binary dummy variable for the 'treatment' of the elimination of LCRs. The construction of a panel dataset enabled me to control for time-invariant differences between countries as well as control for the effect of other time-varying covariates.

In contrast, case-oriented methods allow the more holistic analysis of all of the complex causes that go into the determination of case-specific outcomes, and allow tracing of the mechanisms through which observed impacts arise. This is particularly important when crucial factors evade quantification, such as is generally the case with policy and institutional variables. In this sense, 'within-case' methods such as typified by the historical institutionalist approach, offer a valuable alternative perspective to the causal complexity. At the same time, comparison across small numbers of cases can enable the idiosyncratic factors that lead to divergent outcomes from common policy changes. For these reasons, I complement my panel regression findings with a series of comparative, historical institutionalist case studies, in which I situate the elimination of LCRs within the broader context of policy and institutional reforms and the accompanying shifts in global value chain governance structures. The case study stage thus addresses complementary research questions regarding the extent to which LCRs may be subject to cumulative effects, the examination of which was not permitted in the panel regression stage; the extent to which divergent effects between cases can be observed through the operation of causal mechanisms; and the extent to which countries have mitigated the effects of liberalisation through continued protection and promotion of parts and components suppliers through alternative means.

1.6 FINDINGS, IMPLICATIONS AND LIMITATIONS

To provide a brief preview of the findings of my analysis, my panel regression findings showed that although the elimination of LCRs is associated with a significant reduction in local content levels of the liberalising economies – that is, the proportion of local consumption supplied by

domestically-located firms – there has been no statistically significant reduction in total output, controlling for relevant covariates. More importantly, the countries eliminating LCRs have exhibited large increases in export performance indicators, with no statistically significant reductions in trade balances overall, although import levels have also increased. These empirical results suggest that the elimination of LCRs has been an important causal influence on the improvement of industrial performance outcomes within the countries in which they were previously in force.

The case studies supplement this finding in a number of ways. Most importantly, they situate the improvement of performance outcomes in the context of the causal mechanisms of the ongoing restructuring of global value chains, in which the liberalised economies feature more prominently in the strategic decisions of lead firm assemblers and global suppliers as they consider locations in which to establish production. Thus, improvements measured by macro-indicators of industrial performance mask important effects relating to the denationalisation of parts and components production within all of the cases examined here. These mechanisms also suggest explanations for the divergence of parts and components sector performance across structurally diverse cases, as suppliers are permitted greater latitude to supply foreign markets from the most advantageous locations. In some cases, it appears that LCRs had been implemented with some positive effects on investment inflows and technological cooperation between assemblers and suppliers. Finally, the case studies suggest that generalisations regarding positive effects of the elimination of LCRs must be approached with caution, in the light of wider policy and institutional developments from which they are impossible to distinguish.

The main limitations of the analysis relate to the inherent difficulties establishing causation in the context of profound causal complexity. The strategy I have pursued has gone some considerable way to illuminating the nature of the impacts of the elimination of LCRs on numerous aspects of industrial performance, but the crucial causal mechanisms were examined at a high level of aggregation, incorporating mainly secondary data sources, in order to permit systematic, cross-national comparison. A significant limitation relates to the lack of primary data on micro-level causal mechanisms, through individual firm-level decisions on sourcing strategies, upgrading, and technological cooperation between firms, how these have been affected by greater flexibility afforded by the prohibition of LCRs, and how varied policy and institutional factors in different locations determine the distribution of opportunities different countries have to pursue higher levels of integration into global production networks. Detailed qualitative data are required to supplement my findings in order to fully explain performance outcomes in light of these important phenomena.

1.7 THESIS STRUCTURE

The remainder of the thesis is structured as follows. In chapter 2, I review the literature on the effects of LCRs. Findings that the empirical and theoretical literatures are ambiguous, I synthesise existing conceptual and theoretical frameworks to argue that the effects of LCRs vary in accordance with contextual factors, including industrial capabilities within the wider economy, the prospects for market size, and wider policies and institutions. Because the elimination of LCRs may in principle give rise to positive or negative dynamic effects, I argue that the lack of systematic, cross-national empirical work into this area is an important gap in the literature.

In chapter 3, I present the empirical context in which my research is situated, the elimination of LCRs within the automotive sector. The chapter adopts the global value chain approach as a framework for examining the factors affecting the economic geography of production, trade and

investment within the automotive sector as it pertains to two stages of fragmented production: the manufacture of parts and components by the supply sector, and the manufacture of vehicles by the assembly sector. This chapter serves two main purposes in the context of the thesis. Firstly, it allows for a further examination of the empirical literature on the impacts of LCRs. Secondly, it serves as the basis for the operationalisation of the important concepts and theories as they apply to the subsequent empirical analysis.

Chapter 4 discusses the methodological options available for assessing the substantive questions with which I am concerned. After reviewing the relative strengths and weaknesses of variable- and case-oriented methods for addressing different types of research problem, I justify and describe my mixed method approach, before specifying the substantive research questions I address in each stage. I also specify methodological research questions that emerge from a consideration of the utility of my mixed method approach to impact evaluation in the context of causal complexity. Finally, I specify questions that arise in considering the wider implications of the thesis as a whole.

Chapters 5 and 6 present the empirical work of the thesis, relating to the panel regression and comparative case study stages respectively. In the first stages of chapter 5, I attend to the specification of the regression model. I then operationalise the variables incorporated into the analysis, before presenting the empirical estimation results and discussing their substantive implications. In chapter 6, I provide more specific detail on the purpose and goals of my case studies with respect to their application to complementary research questions, in light of the findings of the first stage of my analysis. I describe the case selection strategy through which I arrive at three paired comparisons: Malaysia and Thailand, Argentina and Brazil, and China and India. Finally, I compare the elimination of LCRs within each pair, highlighting similarities and differences with respect to the causal mechanisms operating within each country.

In chapter 7, I provide my response to the research questions specified in chapter 4. I synthesise the findings from the case studies by comparing the three pairs of cases, with the goal of enabling wider generalisation of my findings. I consider the substantive implications of both stages of my research with respect to my research questions, and consider the limitations of my findings, and of my methodological approach. To conclude the thesis I contemplate the broader theoretical implications of the research conducted here, and consider avenues for future research.

2 LOCAL CONTENT REQUIREMENTS: A REVIEW OF EMPIRICAL AND THEORETICAL LITERATURE ON THEIR EFFECTS

2.1 CHAPTER OUTLINE

In the previous chapter, I introduced the broad empirical context of policy space restrictions with respect to the multilateral trade system, and explored two contrasting perspectives on the 'policy space debate'. I introduced the rationales for unilateral and multilateral trade liberalisation, and reported that the neoliberal argument – that multilateral rules restricting interventionist trade policies are necessarily welfare-enhancing for all participants – has been robustly challenged by structuralist accounts, which allow for pervasive adjustment costs associated with trade liberalisation as well as market failures barring entry into the most valuable activities. I suggested that the implications of the TRIMs Agreement, and more specifically the elimination of LCRs, present an interesting opportunity to conduct empirical, comparative analysis into the impacts of policy space restrictions.

In the present chapter, I explore existing literature regarding the effects of LCRs, which suggests that the effects are ambiguous, and that the effects arising from multilateral restrictions on LCRs is worthy of empirical examination. The chapter is structured as follows. In section 2.2, I provide some basic definitions, situate LCRs in relation to other trade and industrial policy instruments, and identify the rationales for implementing such policies. In section 2.3, I provide an overview of the debates surrounding the developmental impacts of LCRs, and the factors that determine whether they give rise to positive or negative impacts. In section 2.4, I review studies that specifically analyse the effects of LCRs, both theoretically and empirically. Finding the direct evidence inconclusive, I turn to the indirect evidence on the determinants of the effects of trade and investment policies more generally through two conceptual and theoretical perspectives. In section 2.5, I explore the implications of the technological capabilities approach for the analysis of infant industrial policies and the potential for states to shape outcomes through the use of investment performance requirements. Section 2.6 provides a summary of the substantive implications of my literature review. I summarise the existing evidence before synthesising the insights on the theoretical determinants of the effectiveness of LCRs in promoting industrial performance improvements in a coherent framework. Finally, I describe an important gap for empirical, comparative analysis of the elimination of LCRs on industrial performance outcomes.

2.2 DEFINING, SITUATING AND JUSTIFYING LCRS AS A POLICY INSTRUMENT

2.2.1 Definition of LCRs

LCRs basically stipulate that a proportion of the inputs of a firm or sector must be sourced domestically (i.e. not imported). They can take a number of forms, from quantitative restrictions or prohibitions on the importation of certain inputs (also known as 'mandatory deletion lists', where parts or components are deleted from lists of permissible imports) to the stipulation of minimum percentages of total inputs – by value or in terms of physical content – which must be sourced from local suppliers. The policies have been applied in countries of all levels of development, although perhaps more prominently in newly industrialised developing countries. The actual incidence of LCRs, and the manner in which they have been implemented and designed in practice, is discussed below. In principle, the provisions of LCRs can apply to foreign corporations explicitly, or to all locally-based firms. They are usually applied selectively in specific

industrial sectors, which are seen as. LCRs, like other performance requirements, may be mandatory or attached to incentives. Such incentives can take the form of preferential fiscal treatment or direct subsidies to the party subject to the requirement.

At this point it is useful to introduce the agents involved in LCRs – manufacturing firms and the state – and some terminology. LCRs affect different firms in different ways. In the first place, the industry in which LCRs are imposed must incorporate 'upstream' firms supplying inputs to firms 'downstream' in a fragmented production process. Usually, inputs are manufactured intermediate goods, but they could also be commodities; often, and most pertinently to this thesis, firms subject to LCRs are multinational manufacturers of high-tech final goods. Thus, firms can be seen to belong to the final good, terminal or assembly subsectors, and the intermediate, parts and components or supply subsectors, respectively; and they can be foreign or local, or joint ventures between foreign and local capital.

LCRs by their very nature have implications for foreign countries in which potential exporters of intermediate goods to the terminal sector firms are located, as well as for the multinationals potentially subject to LCRs. We must distinguish national and global welfare, to the extent that host countries can, in principle, enhance their own welfare at the expense of others via 'rent-shifting'. We assume, notwithstanding the potential for corruption and political capture, that the goal of the state is to enhance national welfare, while the purported goal of multilateral restrictions on LCRs is to enhance global welfare through the more extensive exploitation of comparative advantage and the curtailment of 'beggar-thy-neighbour' protectionism, regardless of the extent to which individual countries or producers experience adjustment costs relating to competitive threats to specific sectors and activities.

2.2.2 Policy objectives

Before turning to the literature on the effects of LCRs, it is first necessary to expand upon the various formal and implicit policy objectives, and the economic principles behind them. At this stage, we are not concerned with the feasibility of these goals, which is discussed in the following sections.

In the most basic sense, LCRs are aimed at achieving a specified level of local intermediate production. However, LCRs must be considered in the context of wider goals in order to explain their emergence and evaluate their effectiveness more thoroughly. LCRs are aimed at promoting industrialisation by deepening supply networks and upgrading suppliers' capabilities. This relates to economic theories in which the development of technological capabilities and the generation of linkages between firms is subject to positive externalities and market failures and that in the absence of state intervention, outcomes may be suboptimal from the perspective of total societal welfare. This connects with concerns tariff-jumping FDI in fragmented industries might lead to 'screwdriver' operations or 'enclaves' characterised by minimal industrial development.

LCRs have been used in diverse industries, but none so extensively as the automotive sector, in which they were usually "designed to discourage transnational corporations from simply making the country an assembly point for imported components and force them to build up or stimulate the development of component and parts suppliers that would eventually become the core of an integrated industry" (Bello, 2003). The characteristics of this sector, and the role of LCRs therein, are described in chapter 3, while the remainder of this chapter treats LCRs more generically.

I identify two main areas of market failure that serve to justify LCRs; following UNCTC (1991) I distinguish arguments relating to rent-shifting in the presence of imperfect competition from those of the 'infant industry' type in the presence of scale economies and 'learning by doing' within firms. To these arguments can be added those relating to the promotion of linkages

between (foreign and domestic) firms in the context of coordination failures and technological spillovers, which have been largely neglected in the applied literature[4].

2.2.3 Situating LCRs as a policy instrument

To overcome these market failures, LCRs can be seen as working through two separate 'mechanisms'. The first is simply by conferring protective rents on intermediate goods producers, LCRs operate as a form of trade policy. The second is that in implementing LCRs, states engage in a process of bargaining with MNCs, thus conditioning their strategic and operational behaviour; in this sense, LCRs are a form of investment performance requirement.

Situating LCRs in relation to other policy classifications is not simply a semantic venture. Much of the theoretical and empirical evidence presented in this chapter pertains to wider classifications of policy instruments – partly as a result of the paucity of direct theoretical and empirical evidence on LCRs *per se* – and yet remains highly relevant to my understanding of the impacts of LCRs. Thus, situating LCRs as a policy instrument is also an exercise in establishing the parameters of the literature review that follows. In this context, other policies are relevant when determining and evaluating the impacts of LCRs, for two reasons. Firstly, they provide indirect evidence on the utility of LCRs due to their substantive similarities, especially in the absence of direct evidence. Evidence on the impacts of other policies for achieving industrialisation and development goals more generally therefore contributes to my substantive literature review. Secondly, other policies must be recognised in the models and analytical frameworks that inform subsequent empirical chapters, as factors that confound industrial performance outcomes independently as well as in conjunction with LCRs.

2.2.3.1 LCRs as a form of trade protection

LCRs work by affecting the relative prices of domestic and foreign goods for final-good-producing firms. As noted by Harrison and Rodriguez-Clare (2009), LCRs "force multinationals to buy local inputs just as protection induces domestic consumers (and firms) to buy from local producers". In this sense, LCRs can be considered as a form of protective trade policy targeted at intermediate goods sectors. The theoretical determinants of the effects of infant industrial protection are discussed in section 2.5, below.

Equivalence and distinctions between LCRs, tariffs and subsidies

Analysis of the welfare implications of trade policy usually imply that regardless of the justification, lump-sum transfers and direct subsidies targeted at specific market failures are preferable to trade protection. This is the case because protection is "too far removed from the market failure to be effective" (Kumar and Gallagher, 2007: 11) and distorts firms' decisions in ways that are unrelated to the justification for the policy – i.e. they have consumption as well as production effects (Mussa, 1984). Indeed, as the following analysis shows, there are many ways in which trade protection may give rise to impacts contrary to those intended. Nevertheless, protection may be preferable to subsidies for the simple reason that in the context of inadequate revenue collection systems, it provides an effective and potentially progressive means through which to confer rents (see Chang, 2005).

As WTO/UNCTAD (2002) notes, the implications of LCRs and tariffs are similar in that both act by imposing a cost penalty on imported intermediate goods. In the case of LCRs, "the higher the proportion of components that is required to be sourced domestically, the closer their average per unit cost will be to the prevailing domestic price" (ibid.: 22). The effect on intermediate output can be replicated by a uniform tariff on imports at a level that imposes an equivalent

[4] An exception is Veloso (2001), whose research I describe below. This neglect relates to methodological prioritisation accorded to "mathematically tractable equilibrium" in the neoclassical framework (Toner, 1999) frameworks within neoclassical economics as well as difficulties observing spillovers empirically.

alignment of average world and domestic prices. However, as Veloso (2001) demonstrates[5], the welfare effects will be inferior in the case of the latter: since the gap between the domestic and world price varies across the range of intermediate goods, there is divergence between the cost penalty implied by tariffs and LCRs (ibid.: section 3.3.1). The intuitive reasoning behind this findings is that "by imposing the standard and leaving the component sourcing decision to (the assembler), the government knows that it is in the firm's best interest to reach the desired level of domestic purchases with minimal sourcing cost". In principle, it is possible for the state to impose varying tariff levels on different intermediate goods. However, this would require a high informational burden on the government, beyond that required to set a required local content ratio. Mussa (1984) comes to the same conclusion regarding the preference of LCRs over tariffs, based on the superiority of an 'all-or-nothing' penalty for non-compliance under LCRs. This "generates no additional distortion by forcing a divergence between true social production cost (with the distorted choice of inputs) and the price producers must charge" (p. 9), something which cannot be said for the tariff equivalent.

2.2.3.2 LCRs as performance requirement

Following Veloso (2001), to analyse LCRs simply as a form of trade protection is misleading. LCRs also have additional features relating to the specific channels of FDI-led development, technology transfer and linkages, and an important role in state-MNC bargaining. Although both intermediate and final-goods firms can be foreign or local, some of the goals of LCRs are more sensible in the context of a terminal subsector characterised by foreign presence and imperfect competition.

Such situations often result in a process of bargaining between the state and (potential) investing firms, in which the former aim to redistribute a proportion of the MNCs' rents throughout the domestic economy. In this context, LCRs fulfil the function of an investment performance requirement (IPR). Such policies may be valuable in the presence of two conditions: when MNC operations in developing countries involve the accrual of rents (arising from their exploitation of imperfectly competitive market structures, often in combination with protection in the domestic market), and when their strategies conflict with developmental goals "for example with regard to sourcing behaviour and reallocation of profits through transfer pricing practices" (UNCTAD, 2003b).

As I describe in section 2.5, states' bargaining power arises from location-specific advantages such as the domestic market, cheap labour, natural resources, and technological capabilities, access to which it may deny foreign investors. LCRs can be imposed on specific investments, firms, and sectors on an ad hoc basis. IPRs thus allow states to screen and condition the entry of foreign firms, short of denying entry entirely.

The efficacy of these types of policy depends upon the extent to and manner in which they affect the activities of investing firms. As a result, the effects of LCRs can also include outcomes relating to inward FDI and the establishment of linkages. Importantly, the effect of policies is likely to depend upon the characteristics of and motivation for investment, and the characteristics of host countries and local firms, which vary significantly between different sectors.

2.3 THE DEVELOPMENTAL IMPLICATIONS OF THE ELIMINATION OF LCRS

It is clear that despite the theoretical justifications for implementing LCRs as mentioned above, their effects are far from certain. In the first place, they are only justified in the presence of at least one of the market failures listed above. The nature and magnitude of market failures in the

[5] Mussa (1984) and Hollander (1987) draw similar conclusions; Vousden (1987) finds that the preferable instrument depends upon the market structure in the intermediate sector and the elasticity of demand for intermediates.

countries and sectors in which LCRs have been and could feasibly be implemented, as an empirical matter, are therefore of central importance. Furthermore, as suggested above, the implementation of trade and industrial policies such as LCRs are subject to state failures in terms of capacities to 'pick winners' and discipline effectively the recipients of rents. The capacities of states to carry out such interventions effectively is an empirical matter, on which existing evidence is fairly inconclusive. Finally, assuming that states may in principle overcome these implementation problems to enhance their own welfare, such interventions are subject to beggar-thy-neighbour effects that render them suboptimal from a global point of view.

2.3.1 Sources of evidence on the impacts of the elimination of LCRs

Evidence on the effectiveness of LCRs takes a number of forms. Most fundamentally, there is a distinction between formal theoretical modelling and applied empirical research, but we can also differentiate what I regard as direct and indirect forms of evidence. My substantive interest is in the elimination of LCRs as a result of exogenous policy space restrictions. The utility of evidence from formal theoretical models is limited, as I discuss below. There is an important substantive gap in the literature for systematic empirical research into the effects of the elimination of LCRs, which is the gap this thesis aims to fill. Of course, evidence regarding the effects of implementing such policies provides important indirect evidence of the costs and benefits of their restriction, but here too, direct and systematic comparative empirical research is lacking. As a result, broader categories of policy instruments (i.e. trade policies and investment performance requirements) and the liberalisation thereof provide a useful context that indirectly informs the conceptual and theoretical framework I develop in the course of the chapter.

Ultimately, the evidence on the impacts of LCRs is highly ambiguous, but the literature does permit a number of insights about the determinants of their effects. Before turning to specific forms of direct and indirect evidence, I first examine potential sources of contention, in terms of theoretical arguments for and against LCRs from the host country and global perspectives. The following is largely based on UNCTC's (1991) review of the evidence on TRIMs conducted in the midst of the Uruguay Round negotiations that lead to the establishment of the WTO.

2.3.2 Strategic trade theory, imperfect competition and rent-shifting

Strategic trade theories initially emerged as an attempt to explain the empirical phenomenon of intra-industry trade, taking place between similarly endowed countries via large powerful firms, which diverged from the predictions of comparative advantage and the framework of perfect competition that characterised neoclassical trade theory (WTO, 2008). The crucial contribution of strategic trade theories relates to the incorporation of market imperfections and barriers to entry arising from increasing returns to scale[6]. The key point, as Brander (1995) notes, is "that strategic relationships between firms introduce additional motives for trade policy, over and above (those) that arise in all market structures". Further theoretical developments in the strategic trade literature pertain to the attainment of agglomeration economies arising from the incorporation of intermediate inputs in manufacturing (e.g. Krugman and Venables, 1995). These agglomeration economies, also known as external economies of scale, pertain to reductions in costs that occur when economic activity takes place in geographic proximity to related activity. Because the manufacturing sector is a source of its own demand, firms are subject to "forward and backward linkages in the manufacturing sector" (WTO, 2008: 89).

[6] Increasing returns to scale can be easily observed in the real world. The phenomena can arise from a number of sources, but basically can be seen as a reduction in average costs that arise from increasing output in the presence of fixed costs (WTO, 2008: 43) as well as the more efficient exploitation of the division of labour within individual firms (Thirlwall, 2006: 83).

The implications of strategic trade theory are that "for rent-shifting to be feasible, one only need assume the presence of imperfect competition in the industries in which international trade and investment take place, generating oligopoly rents for firms in those industries" (UNCTC, 1991: 36). Because of their market power, multinational assemblers may have some flexibility regarding strategic and operational matters, with multiple potential sites of production and sourcing options. As Moran (1998) conclusively demonstrates, this is a reasonable assumption for sectors in which FDI is most prominent, and those in which policies such as LCRs have been implemented. Insights from the strategic trade literature thus provides two insights: that governments can use trade policies firstly to shift rents from foreign oligopolists to domestic tax authorities; and secondly, in relation to the effects of LCRs, that they can encourage the establishment of domestic intermediate production facilities (and thus, shift rents to domestic producers).

In cases where manufacturing takes place in multiple stages, foreign firms in the terminal sector (in which market power resides) can exercise market power over local suppliers (as well as local consumers), pushing up consumer prices, driving down the price of intermediate inputs and resulting in suboptimal output levels. In principle, LCRs can transfer a proportion of the foreign firm's rents to local suppliers to correct the distortion and enhance host country welfare.

The specific circumstances in which a rent-shifting trade policy correction leads to improved welfare are discussed in greater depth in the analysis of formal theoretical models below; suffice to say here that they are fairly limited but importantly, are not the sole justification for LCRs. In the presence of technological market failures, "trade protection takes on a much more important role than mere rent-shifting" (ibid.). Not only that, but as Krugman (1987) observes, "policies to promote sectors yielding external economies need not affect other countries adversely": thus, under plausible circumstances in which learning and the establishment of linkages are characterised by market failures, LCRs can enhance not only domestic but also global welfare.

2.3.3 Market failures in technological development

The infant industrial argument holds that in industries in which scale and learning are crucial to the attainment of efficient production processes, new firms face huge disadvantages with respect to established firms. Protection is a means through which to provide local firms "preferential opportunity to reap the benefits of economies of scale, to create or refine technologies associated with large production runs and to work their way along the experience curve of managing large operations, while denying this opportunity to external firms" (UNCTC, 1991: 38). Substantial costs and high levels of uncertainty associated with technological accumulation is hampered by imperfect information and failures in credit markets. LCRs are thus intended to enable the more efficient utilisation of scale and provide additional rents to suppliers in order to overcome costs and uncertainties of investing in new and advanced technologies.

Market failures in learning within firms are further exacerbated by interdependence in firms' production, investment and learning decisions. The interdependence of terminal and supply sectors can motivate the deliberate transfer of technology from one to the other, since assemblers will benefit from both the presence and the more efficient operation of suppliers (and vice versa), but there are a number of circumstances in which markets will fail to promote linkages at socially optimal levels. In the first place, the coordination of activities between manufacturing firms is subject to coordination failure. Faced with imperfect information and in the presence of scale economies and costly and uncertain learning processes, there is a 'chicken and egg' type problem: "new activities are hard to develop unless their suppliers are present, but why would the suppliers exist if they have nobody to sell to" (Hausmann and Rodrik, 2006: 8). Furthermore, technology transfer is subject to many important benefits which cannot be internalised by the proprietor of the technology in question; thus, technological leaders may not cooperate with other firms even if such arrangements were, from the perspective of society as a

whole, more efficient. In both cases, LCRs can help to ensure that technology transfer and the integration of intermediate and terminal sector firms reaches a more socially desirable level.

2.3.4 Suboptimal learning environments and rent-seeking behaviour

The most fundamental objections to LCRs relate to the difficulties actualising dynamic learning and scale economies, and fostering linkages and technology transfer in practice. Rent-shifting may lead to reductions in consumer welfare and, perversely, negative effects on local intermediate suppliers as well; it may exacerbate imperfect market structures and the malign effects arising therefrom. Thus, "improperly constructed public policies can have a disproportionately malign impact on trade and investment" (UNCTC, 1991: 36).

A number of scholars acknowledge the potential for host economies to implement domestic-welfare-enhancing interventions in the presence of increasing returns to scale, but critique "the new interventionism" based on "judgements about the politics of trade policy" (Krugman, 1987: 139) which echo the concerns about information and incentives discussed above: strategic trade policies are theoretical plausible but highly difficult to implement effectively in practice. Such objections point to suboptimal learning environments in developing countries arising from, *inter alia,* the limited scale of domestic markets[7]; insufficient technological capabilities within the local economy[8]; and reluctance on the part of multinationals to engage in meaningful technological cooperation with local firms, as a result of the first two issues but also due to strategic motivations. As Moran (1998: 43) notes,

> Domestic content requirements have an adverse impact not because [markets] already function perfectly on their own, but because attempts to 'improve' the functioning of markets […] generate technical, economic, managerial, and political-economy problems for the investors and for the host country. These problems interact in a perverse manner and tend to reinforce each other towards inefficiency and stasis.

In these conditions protection serves to insulate firms from the competitive pressures that drive upgrading and discourages technology transfer. Both foreign and local firms become centred on "trying to offset high inefficiency through compensation from artificial profits in the protected markets" (UNCTC, 1991).

In addition, they are characterised by a prisoner's dilemma: "if all follow their own self-interests instead of cooperating to stabilize individual behaviour, they will all end up worse off" (ibid.: 42). Finally, it is argued that in playing the strategic trade game, smaller and poorer countries are inherently disadvantaged compared to countries with larger markets, larger and more competent firms, and greater fiscal capacities to subsidise industry. In short, developing countries "do not have the resources to compete with developed countries in the struggle for international investment and often are driven to make poor policy choices in the effort to try. This not only results in economic inefficiencies but also generates a perverse political-economic dynamic as well: firms and workers with protected positions utilize what economic and political clout they

[7] The argument notes that infant industrial considerations require "a domestic market large enough to allow exploitation of the economies of scale inherent in the industry. In the case of most developing countries, a protected domestic market is likely to be small relative to the minimum efficient size of production, let alone in comparison with any massive economies of scale realizable only if the firm reconfigures itself to serve global markets" (UNCTC, 1991: 40).

[8] As Narula and Dunning (2000: 161) put it, LCRs "do not, by themselves, result in backward linkages, because learning requires domestic firms with the appropriate skills to internalize them, and the conditions which make this necessary". It is

have to slow down or prevent efforts to liberalize trade and investment flows" (Moran, 1998: 102). As a result, multilateral restrictions on strategic trade policies may benefit developing countries disproportionately.

These objections are largely based on the empirical literature on LCRs and other forms of protection, as well as theoretical concerns about state capacities to design policies and discipline rent-seeking behaviour effectively. However, it is worth noting that the empirical record is mixed, based on a rather limited number of direct studies but also more extensive empirical work on similar types of policy intervention. In addition, the theoretical case for LCRs, the circumstances in which they may be effective, and the way that these circumstances pertain to countries at different stages of development, are also highly ambiguous.

2.4 DIRECT EVIDENCE ON THE EFFECTS OF LCRS

2.4.1 Theoretical models

Numerous studies have assessed the impacts of LCRs through formal economic modelling, with findings heavily dependent upon assumptions and specifications; "with regard to their welfare impact, theoretical models produce different results depending on the model specifications and on whether one is considering world welfare, that of the home country or that of the host" (UNCTAD, 2003a: 7-8). One of the most profound points of contention is simply the ways in which markets are most usefully characterised with respect to competitive structures and the presence of market failures. This has led to an abundance of theoretical models analysing LCRs under different market structures and, far less commonly, models that incorporate dynamic effects and externalities.

The most basic models assume perfect competition in both sectors, along the lines of standard neoclassical trade theory. According to Balasubramanyam (1991), naïve models with no domestic protection to the final-goods sector posit that LCRs reduce domestic production of the final good, transfer producer surplus from domestic to foreign firms, and unambiguously reduce host country as well as global welfare. In this framework, LCRs are only feasible in the context of trade protection in the terminal sector, since otherwise, "imports of finished products will increase and undermine the effectiveness of the LCR" (WTO/UNCTAD, 2002: 22). As a result, the impacts of LCRs and tariffs on final goods are often considered in combination.

Of course, in the neoclassical framework, the induced protection of the terminal sector also distorts prices and further reduces welfare; the 'first best' solution is free trade. However, as UNCTC (1991) correctly observes, the industries in which LCRs are usually implemented are far from perfectly competitive, and are instead dominated by foreign oligopolists (see Moran, 1998: 21-23) for an empirical examination of market structures in sectors in which FDI occur). In this context, the goal of LCRs from a host country perspective is to "extract the maximum possible share of the gains from FDI" (Balsubramanyam, 1991).

Thus, LCRs can feasibly enhance national welfare at the expense of foreign firms and countries with two complications:

a) that final goods firms would need to be provided with additional incentives (i.e. protection) to remain in the market; and
b) that rent-shifting within imperfectly competitive markets give rise to additional distortions,

both of which need to be considered in terms of their welfare effects. Thus, much of this literature is highly critical of LCRs, viewing them as a form of protection motivated by rent-shifting which distort prices and reduces welfare globally and, more often than not, nationally as well. In the absence of dynamic market failures, LCRs are simply an additional cost to input users, which is only in certain limited circumstances absorbed by foreign firms and is otherwise transferred to consumers and domestic producers. This leads Greenaway (1992: 151) to conclude that "there must be a strong presumption that (the effect) is welfare reducing".

However, it is important to note that under plausible assumptions, even some of these studies have shown LCRs "to have favourable developmental effects and to be welfare improving for host countries" (Kumar, 2005: 186) due to rent-shifting effects. Furthermore, to the extent that some studies (Balasubramanyam, 1991; Veloso, 2001) acknowledge dynamic learning and inter-firm spillovers, the welfare implications – both nationally and globally – are ambiguous but much more likely to be positive.

The early contribution of Grossman (1981) "embodies the critical intuition that has been used to explore this issue in most of the subsequent literature" (Veloso, 2001). Grossman (1981) demonstrates that in the presence of a domestic intermediate sector characterised by high costs, LCRs have a welfare reducing impact. LCRs are seen to benefit input suppliers at the expense of final goods producers and consumers, both of which pay higher prices. Impacts on the trade balance and levels of domestic value-added are ambiguous, and depend upon the relative elasticities of demand for inputs and final goods and thus the extent to which the LCR leads to a reduction in local production of the final good. The perverse outcome is therefore that LCRs aimed at raising domestic intermediate producer surplus, output and exports "may have quite the opposite effect" quite aside from the wider welfare implications (p. 589).

Subsequent models have usually involved the incorporation of different market structures in the terminal and intermediate sectors, and alternative configurations of the determinants of demand for inputs. Hollander (1987) assumes the presence of a foreign monopolist in the terminal sector and posits the existence of multiple inputs, and finds that it is possible to design local content policies to induce an increase in the output and range of intermediate goods produced locally; domestic welfare effects are ambiguous. Davidson et al. (1985) consider the context of a foreign duopoly. They report a loss of consumer surplus, the effect of which on national welfare is offset by shifting rents from foreign to domestic producers, leading to ambiguous overall effects on national welfare; global welfare and output decline. Richardson (1991) also constructs a model with two final-good-producing firms – one foreign, one domestic – but posits that their market power is in relation to suppliers, rather that consumers (i.e., is duopsonistic). It is further assumed that the domestic assembler can only source inputs domestically, whereas the foreign firm can import them. Perversely, Richardson finds that LCRs "may raise the foreign firm's profits in this duopsony setting by committing it to use more of the domestic input, thus pushing up its price and leading the domestic firm to contract" (1991: 144).

Turning to models that incorporate alternative market structures in the intermediate sector, Krishna and Itoh (1988) analyse the effects of a duopoly in the intermediate sector in the context of strategic behaviour. Interestingly, they find that LCRs can have welfare implications even if they are set below the binding level (i.e. assemblers already choose to exceed the specified local content level) by affecting firms' strategic interactions. In addition, depending upon the degree of substitution between intermediates, prices may fall in response to the LCR. They conclude that, although welfare impacts are ambiguous, the "likelihood of welfare improvements through such policies does not seem very great", due to the potential for large cost distortions in the terminal

sector, as well as the diversion of resources due to lobbying in the presence of protective rents (1988: 123). Beghin and Sumner (1992) investigate the situation of a 'bilateral monopoly', with a domestic intermediate cartel and an import-competing final good monopolist. They find that an LCR is a potentially efficient way to shift rents from foreign to domestic producers. Belderbos and Sleuwaegen (1997) present a model of monopolistic competition in both subsectors, with findings similar to the welfare implications of Grossman's (1981) model.

Some of the later models explore welfare implications in the context of dynamic employment effects and a more nuanced treatment of foreign investment. Lahiri and Ono (1998) explore an oligopolistic final good sector in which foreign and domestic firms are present, to argue that LCRs can be used to enhance the domestic employment effects of FDI. Similarly, Yu and Chao (1998) show that LCRs can enhance domestic welfare if targeted at an intermediate (rural) sector in which unemployment is more prevalent compared to the terminal (urban) sector. Richardson (1993) explicitly considers LCRs in a general equilibrium framework in which the 'second best' context of an incentive to final good production – usually in the form of tariffs on final goods – is recognised, and is assumed to fully mitigate any impacts of the LCR on final goods output. Besides the incorporation of a tariff on final goods, Richardson (1993) considers the possibility that foreign final-good-producing firms can displace domestic demand for intermediates, and that foreign firms can invest in the intermediate as well as the final good sector. The author argues that these features in combination – which are empirically plausible – mitigate the negative welfare impacts of LCRs. Specifically, the model demonstrates that the LCR can induce inward investment in the intermediate sector, enhancing welfare overall. This is an important issue, since LCRs had previously been assumed to discourage FDI, when in fact this may only apply to the terminal sector (and even then, effects may be offset through other incentives).

Balasubramanyam (1991) distinguishes the static cost of protection from the dynamic benefits arising from the promotion of supplier capabilities. This study recognises, but does not formally model, the market failures that reinforce the rationale for LCRs additional to the potential for rent-shifting:

> Promotion of local supplier capabilities involves identification of the existence of prospective suppliers of inputs, their development through the provision of technology and know-how, and the provision of an assured market. In many cases local input-supplying industries may not exist because of the absence of an assured market for their products. Local content requirements force foreign firms to identify nascent local capabilities and provide them with the know-how and technology (p. 1219).

In contrast to this, Mussa (1984) discusses potential negative dynamic effects. Relaxing the assumption of perfect substitution between foreign and domestic inputs as well as exploring imperfectly competitive market structures, Mussa (1984) shows that the overall impact on domestic intermediate production depends upon the degree of substitutability between domestic and foreign inputs, especially in relation to the costs of technological improvement. In light of this substitutability, LCRs introduce a potentially damaging distortion into firms' innovative strategies. As Mussa (1984) puts it, "diminished incentives for improvements in technical efficiency that save on domestic inputs provide a serious argument against use of content protection". This contention relates to dynamic effects in the presence of rent-seeking behaviour that supplement the static effects. The latter point to the enhancement of suppliers' market power and surplus amidst an overall reduction in societal welfare.

Veloso (2001) marks a significant departure from previous studies, deriving a formal model to account for learning externalities and/or coordination failures which are not accounted for by foreign investors or local firms. The author is critical of existing theoretical studies, which he argues are characterised by frameworks which have "assured that performance standards in their very nature could lead to no other outcome except distortion" (ibid.: 29). Thus – notwithstanding the ambiguous welfare findings of several models – LCRs are usually seen to reduce consumer surplus and introduce additional costly distortions into the economy, without any guarantee of enhanced intermediate output or domestic surplus. In contrast, Veloso (2001) shows that LCRs will enhance welfare unambiguously when empirically feasible externalities are present in the model.

In summary, it is worth quoting UNCTC's (1991: 36) observation that

> under assumptions of imperfect competition, the outcome from public intervention cannot be assumed to be automatically undesirable or distortionary, but neither can it be assumed to be beneficial or welfare enhancing. There is no substitute for detailed analysis of the conditions for and nature of each kind of intervention.

Bearing in mind the ambiguity of the theoretical evidence, I now turn to the implications of empirical work on the effects of LCRs.

2.4.2 Empirical research

Given their substantive importance, it is perhaps surprising that there is little systematic empirical evidence on the incidence and impacts of LCRs, and indeed investment performance requirements more generally. According to UNCTAD (2001a), empirical analysis of the latter is limited by a number of methodological difficulties. Policies are inevitably implemented in the context of "a larger framework of investment incentives and disincentives in which their effects may be difficult to distinguish from those of other measures", there is little in the way of systematic data on the incidence of such measures, and theories that underlie empirical assessments are complicated by the presence of heterogeneity at the country level (p. 59). These limitations guide my own research design and methodology as I seek to carry out systematic comparative research.

Nevertheless, there are a number of sources of empirical evidence on the effects of LCRs, which broadly fall into the categories of quantitative and case studies. The most important dependent variables – following the goals of LCRs, discussed above – have included production, trade and inward investment in the intermediate and terminal sectors, as well as productivity, technology transfer and sectoral growth rates. In this section, I summarise the general evidence in order to illustrate that the empirical evidence on the effects of LCRs *per se* is sufficiently ambiguous to warrant further investigation, before turning to sector-specific evidence on the automotive sector in chapter 3.

2.4.2.1 Quantitative studies

Early sources of evidence, based on surveys of firms subject to investment performance requirements and countries implementing them, are summarised in UNCTC (1991) and WTO/UNCTAD (2002). Their findings can be summarised as follows. A survey of foreign subsidiaries of US firms conducted in 1977 found that 6% were "subject to" TRIMs, while a 1988 survey found that 58% of investment was actually "covered" by TRIMs. UNCTC (1991) explain this discrepancy with the fact that the majority of TRIMs were reported as "discretionary and negotiable" (ibid.: 29), were not always enforced, or may be redundant to the extent that once

they have 'worked' – i.e. the requirements have been satisfied – TRIMs do "not require the investor to undertake actions the parent firm… is not planning to undertake anyway" (ibid.: 30). As a result, the surveys confirm, firstly, that LCRs appear to have had very little impact on firm decisions, at least in terms of discouraging investment: "Foreign investors are not 'jerked around' in conspicuous ways as the neo-classical paradigm would suggest" (ibid.: 54). As summarised by WTO/UNCTAD (2002: 25-6),

> most respondents… indicated that the existence of performance requirements was only a minor factor in their decision about where to invest and produce, and the existence of performance requirements did not in themselves prompt investors to consider moving their production elsewhere.

Secondly, the surveys "suggest that the aggregate trade impact of performance requirements has been relatively small" (ibid.: 24). In some cases, investing firms have reported that TRIMs (including LCRs, and accompanied by investment incentives such as trade protection) "allowed foreign firms a greater presence than would have been the case with an open market" (UNCTC, 1991: 47). In others, "TRIMs did not require investors to alter their patterns of purchases or sales significantly to meet the requirements" (ibid.: 50). These findings seem to contradict theoretical expectations that LCRs have systematically damaging effects, and suggest that LCRs may be used to 'speed up' the search for local suppliers in the presence of the 'rigidities' of exit and start-up costs (ibid.: 55). Thus, the early surveys of firm responses point to the need for more comprehensive empirical work into the effects of LCRs on trade and investment flows as well as the efficiency of their implications for resource allocation.

Econometric studies on the effects of LCRs are fairly few and far between. Beghin and Lovell (1993) and Beghin et al. (1997) examine the impacts of LCRs on the Australian and US tobacco industries respectively. The authors show that imported tobacco fell significantly alongside slight drops in output, findings consistent with rent-seeking behaviour by domestic producers. In any case, tobacco production is an industrial sector in which the broader policy goals of LCRs are unlikely to be actualised. Using firm-level data on Japanese and US subsidiaries, Hackett and Srinivasan (1998) showed that less restrictive local content regimes were associated with significantly higher flows of Japanese FDI, with insignificant effects on US FDI. The explanation posited by the authors relates to differences in supply structures, and thus the costs of switching suppliers, between Japanese and US multinationals. Kokko and Blomstrom (1995) use data from US subsidiaries to show that the imposition of IPRs has negative effects on technology transfer to subsidiaries. However, the explanatory variable incorporated numerous separate IPRs, and so is not specific to LCRs. Additionally, the dependent variable was a measure of formal technology transfer, which may be less relevant in the context of informal knowledge spillovers (which are also very difficult to measure directly).

In a similar vein, Kumar (1994) regresses the export orientation of US subsidiaries on a host of country characteristics (based on Dunning's advantage framework, discussed below), one of which includes the 'intensity of performance requirements', including LCRs. The 1994 study finds no significant effects of performance requirements on the incidence of exports back to the US. Subsequent studies by the same author – Kumar (2000, 2001) conducted a series of quantitative studies utilising a large firm-level dataset on Japanese and US manufacturing subsidiaries – show that performance requirements have the general effect of discouraging investment. More importantly, however, the same studies have involved analysis of the quality of FDI flows, in terms of the extent of localisation, the technology intensity of activities, export orientation, and innovation. The important finding is that LCRs are positively and significantly associated with the

incorporation of local value-added into manufacturing activities, and thus, "those that enter are likely to contribute to host country industrialization" (Kumar, 2000: 464); LCRs are "effective in improving the quality parameters they intend to achieve" (Kumar, 2001: 44).

2.4.2.2 Case studies

In a similar vein to the theoretical studies, the findings of which are inconclusive in terms of their public policy implications, the case study evidence seems to "cluster at two extremes. Failures are associated with sub-optimal economic size and shelter from competition, with subsidies to make up for permanent high costs. Successes are associated with full utilization of economies of scale and ultimate subjection of the project to competition" (Veloso, 2001). Moran (1992) concurs that evidence "support(s) the view that TRIMs, like other public-sector interventions in imperfect markets, enhance resource allocation if they help all potentially comparable locales utilize foreign investment to penetrate global markets, but detract if they merely insulate high-cost operations from competition"[9]. Similarly, UNCTC (1991: 57) observes that "import substitution projects subject to TRIMs are more likely to fall into the category of economic failures than export-oriented projects".

In the negative cluster, Moran (1998: chapter 4) provides evidence of some of the more malign effects of LCRs, citing instances in which LCRs were not amenable to the achievement of efficient levels of scale, especially in the automotive industry, in which investments were largely motivated by import-competing and characterised by strategy concerns in the presence of oligopoly. In particular, Moran (1998: 43-44) distinguishes the effects of limited scale in the domestic market from lags in the introduction of advanced technology that arise as a result of rent-seeking behaviour by foreign assemblers. However, as I discuss more extensively in chapter 3, it is difficult to isolate the effects of LCRs from that of the suboptimal, protected environment in which they were implemented.

More positive evidence is reported in Kumar (2005) in the cases of the automotive sectors of Brazil, Mexico and Thailand, and UNCTC (1991) in the cases of the chemical and computer industries. In line with rapid market growth in which scale economies could realistically be achieved, LCRs have on occasion fitted the scenario "in which a fear-of-loss coupled with a promise-of-gain can propel a transnational corporation out of a sticky pattern of operations" (ibid.: 59). I examine the secondary literature on the effects of LCRs in the automotive sector in more detail in my empirical chapters; suffice to say here that, as WTO/UNCTAD (2002: 23) acknowledges, while case study evidence is useful in some respects, "in most instances the conclusions drawn have not been supported through systematic cross-country analysis". Thus, substantively and methodologically speaking, it is clear that there is an important gap for comparative analysis into the impacts of the elimination of LCRs, from an empirical perspective. In the remainder of this chapter, I introduce and justify the conceptual and theoretical frameworks that inform my subsequent empirical analysis.

2.5 CONCEPTUAL AND THEORETICAL FRAMEWORKS

2.5.1 The technological capability approach

In traditional neoclassical trade theory, technology is seen as exogenous; innovation and technological development are 'assumed away' (Lall, 2004). However, as noted by Chang, "this is

[9] Moran (1998) is generally more sanguine about export requirements, which, in his view, are more likely to lead to the integration of local subsidiaries into parent firms' global production networks.

assuming away the very thing that makes some countries developed and others not – namely, their differential abilities to develop and use technologies, or what are known as 'technological capabilities'" (Chang and Lin, 2009).

In the first place, firms in developing countries do not tend to be the originators of technology, and indeed tend to be deficient in innovative capabilities. This implies that developing countries must import technologies from abroad. However, most technology is controlled by MNCs who "seek to exploit their proprietary technologies in commercial technology markets for maximum gain" (UNCTAD, 2001b: 90). "The result is a gap between the technology developed and owned by firms in developed countries and that which can be obtained and utilized by developing countries" (ibid.: 1). While MNCs may transfer technology through the establishment of foreign subsidiaries and through their linkages with the wider economy, there are limitations to the feasibility of industrialisation based purely on openness to FDI, as discussed below.

Assuming the technology is available, its mastery still requires costly learning beyond the price paid to the originator. Such technology may be formal and codified but also comprises significant tacit elements. Even if the codified technology (e.g. blueprints) is fairly unsophisticated, successful mastery requires firms to invest in "new skills, routines, and technical and organizational information" of a tacit nature in order to work out how best to translate the codified information into efficient productive activities (Lall, 2004). To the extent that capital equipment and organisational capacity require 'lumpy' fixed investments (as they will for manufacturing activities), learning is also subject to economies of scale.

The tacit nature of technology gives rise to some profound implications for industrial development. As Pack and Westphal (1986) demonstrate, firms do not face perfect information about the nature of the learning process, or of the alternative technologies available to themselves and other firms. This relates to a further point, that processes of learning involve "fundamental uncertainty (and not just calculable risk)… unless you actually enter the industry and develop it, it is impossible to know how long it will take for the country to acquire the necessary technological capabilities to become internationally competitive" (Chang and Lin, 2009: 19). This may make investment via financial markets prohibitively expensive, especially in developing countries, "where credit and insurance markets are particularly imperfect" (Chang and Cheema, 2001: 19).

The costly and uncertain nature of learning is further exacerbated by interdependence in firms' production, investment and learning decisions. Successful learning outcomes depend upon the extent to which complementary skills and resources are available, either within the firm or within the wider economy. These factors comprise technological capabilities at the firm and national levels, respectively[10].

More advanced, innovative activities require considerable investment in human and physical capital as well as the establishment of dense linkages with external agents, including firms involved in upstream or downstream stages of fragmented production, and inputs such as research bodies, standards and metrology, and training institutions which have public goods characteristics and/or for which market are incomplete.

Factors both internal and external to the firm thus assume great importance in the acquisition of capabilities. Internally, larger and more profitable firms are better able to overcome the inherent costs and uncertainties of learning that small ones. Externally, learning requires access to

[10] Technological capabilities at the firm-level can be simply defined as the skills and resources that enable firms to create, use and adapt technology effectively in production. National capabilities are simply an aggregation of physical and human capital and technological effort (such as expenditure on R&D), embodied in both private and public organisations. See Lall (1992).

complementary sources of technology and the inputs required to use them effectively. It is therefore crucial to note that investments in technological capabilities have impacts beyond the boundaries of firms which cannot be internalised, leading to suboptimum private investment in learning. As Lall and Teubal (1998: 1374) recognise,

> Learning is invariably characterized by externalities, spillovers and deliberate (often nonmarket) exchanges of information and skills. This results in collective learning of technology and routines in networks of related activities. So dense and crucial are these linkages that it seems a misnomer to call them "externalities" at all.

There are two main types of externality: coordination failures and information spillovers (Hausmann and Rodrik, 2006). In the case of coordination failures, to the extent that learning must occur simultaneously in multiple firms (i.e. in the case of fragmented production processes), it may be a halting and difficult process". Firms (and workers) face decisions whether to invest in a specialised technology (or skill), the return on which depends on the simultaneous presence of demand and the supply of complementary skills and technology. In such circumstances, "the economy may get stuck in a low-income, low-tech equilibrium even though the high-tech sector is viable" (Rodrik, 1996). The interdependence between firms can also motivate the deliberate transfer of technology from one to the other.

Information spillovers can occur for two main reasons: imitation or reverse engineering of technology (demonstration effects); and labour market mobility. In the first case, firms exposed to technology upgrade their own, giving rise to benefits not factored by the technology user (who indeed may face enhanced competition as a result). In an extension to this idea, again taking the broad view of technology, 'self-discovery' – i.e. learning what activities one can profitably undertake in a given economic context – is limited because "the initial entrepreneur who makes the 'discovery' can capture only a small part of the social value that this knowledge generates", while bearing all of the risk (Hausmann and Rodrik, 2003: 4). Labour market spillovers occur as workers can transfer their accrued tacit knowledge of productive processes to other firms. This weakens the incentives for firms to invest in training and skills development, since they are not able to internalise the benefits.

The structuralist response to multiple market failures in technological development involves a controversial approach to the issue of incentives, from which are derived two main policy implications, relating to the use of trade policy for infant industrial purposes, and investment performance requirements for conditioning the activities of foreign firms. With respect to FDI, while it acknowledged that foreign capital and technology have a crucial role in developing countries in light of the deficits described above, FDI-led growth is subject to "basic paradox: with weak local capabilities, industrialisation has to be more dependent on FDI. However, FDI cannot drive industrial growth without local capabilities" (Lall and Narula, 2004: 457). In this regard, as Lall (1992) argues, it is essential that firms are subject to an incentive structure that balances competitive pressures with the accrual of sufficient profits or 'rents' for the requisite investments in technological upgrading to be made. Thus, while competitive pressures can drive technological effort, they can be a double-edged sword, and stifle upgrading. A temporary deviation from competition, in the guise of infant industrial protection, may be desirable.

2.5.2 Infant industrial protection and capability development

Infant industrial protection is a means through which to provide local firms "preferential opportunity to reap the benefits of economies of scale, to create or refine technologies associated with large production runs and to work their way along the experience curve of managing large operations, while denying this opportunity to external firms" (UNCTC, 1991: 38). Indeed, as Shafaeddin (2003: 18) notes, export expansion has been ultimate goal of infant industrial protection since its theoretical conception; protection should be phased out as firms move rapidly

down their cost curves, until the sector is competitive without support, at which point new activities may be identified and promoted.

This characterisation of the ideal sequencing of protection and liberalisation differs from the recommendations of rapid 'across the board' liberalisation as well as of uniform and/or permanent protection. The approach is both time-bound and selective. According to Akyüz' (2005a: 22) model, countries should implement protection based on feasibility of closing the gap between local and foreign productive capabilities, starting in sectors in which dynamic learning and spillovers are most likely to arise in relation to current activities. In the words of Hausmann and Rodrik (2006: 25), a country's existing industrial structure shapes future opportunities for diversification:

> New activities… need to exploit *existing capabilities*, by which we mean *the markets, physical and human assets, norms and institutions that were developed and accumulated for other pre-existing activities.* These capabilities will be useful to the extent that they are *similar* to the needs of the new activity in question.

Targeting industries in which existing capabilities are sufficiently close to technological leaders reduces the level (and cost) of protection required to enable local firms to compete, and ensures that learning processes are shorter and easier to master. In the context of such market failures, the very basis for trade protection is to "*strategically* violate (comparative advantage) knowing that this will result in a loss of current income but… can put the country on a higher growth trajectory in the medium to long run" (Chang 2006: 34). Chang supposes

> some kind of inverted-U-shaped relationship between an economy's deviation from comparative advantage and its growth rate. If it deviates too little, it may be efficient in the short run, but its long-term growth is slowed down, as it is not upgrading. Up to a point, therefore, increasing deviation from comparative advantage will accelerate growth. After a point, negative effects of protection (for example, excessive learning costs, rent-seeking) may overwhelm the acceleration in productivity growth that the 'infant' industries generate, resulting in negative growth overall (Chang and Lin, 2009: 14-15).

For neoliberals, distorting prices with selective trade policies is a highly dangerous developmental strategy. Political economy arguments noted previously (rent-seeking and incapacity to pick winners) are used to justify neoliberals' preference for open and sectorally-neutral trade policies. For structuralists on the other hand, sectorally neutral policy "makes little sense when learning processes and externalities differ by technology, as they inevitably do" (Lall, 2004: 11). Furthermore, from the structuralist perspective it is "important to reiterate that infant industry protection is only part of industrial policy, and by itself can be harmful and ineffective" (ibid.: 13). As suggested in Schmitz's (2007) framework, import substitution policies often failed in Latin America because 'support' was not adequately offset by 'challenge', either in the form of market competition or state performance requirements; as Bruton (1998: 903) demonstrates, "the principle reason for the failure of import substitution was that, as practiced, it created an environment that discourages learning". This suggests that trade policies have divergent impacts depending upon their conjunction with other conditions. If they are implemented in conjunction with competitive pressures as well as policies and institutions that encourage rapid learning, then in principle, infant industrial strategies may give rise to virtuous, cumulative processes of scale, learning and agglomeration to enable an inefficient industry to upgrade rapidly and permit gradual liberalisation with minimal adjustment costs.

In this sense, proponents of the technological capability approach acknowledge the potential benefits of multilateral liberalisation, provided sufficient flexibility is maintained. As Lall (2004: 27)

acknowledges, multilateral constraints "may prevent the more egregious forms of intervention that led in the past to inefficiency, rent-seeking and technological sloth. They are also beneficial to countries that have already developed strong capabilities behind protective barriers and should exploit them in competitive production".

Empirical research has failed to find convincing evidence that trade liberalisation systematically improves economic performance, or conversely, that trade protection is necessarily damaging. Early country case studies (e.g. Little et al., 1970; Krueger, 1975) have exposed the excessive costs of high levels of trade protection. These excessive costs are hardly disputed, but neither do they make an unambiguous case that protection *per se* is damaging. Perhaps the most substantial refutation comes from evidence from East Asia. While they have been deemed 'liberal' and 'outward-oriented' (Balassa et al., 1982), the evidence suggests, on the contrary, that infant industrial protection, of a highly selective and discretionary form, has featured heavily in their success (Wade, 2005; Chang, 2006); for example, the globally-competitive Korean steel and automotive sectors were both fostered under substantial levels of protection from imports. More generally, referring to the diverse subjects of Chenery et al.'s (1986) study, Ocampo and Taylor (1998: 1542) point out that "at the sectoral level export expansion was almost uniformly preceded by a phase of successful import substitution".

Turning to liberalisation, the evidence is similarly mixed. At the country level, the case study evidence in favour of liberalisation often turns out to confirm the benefits of a sequenced and pragmatic approach to trade reform; in the view of Chang (2005: 88) it is consistent with "the well-established historical pattern… that trade liberalization is better seen as the outcome of development, rather than its prerequisite".

There is little doubt that numerous countries throughout the developing world have had excessively restrictive trade regimes, the liberalisation of which has usually included the beneficial effects of competition and the availability of high-tech consumer and capital goods (Dornbusch, 1992). On the other hand, rapid liberalisation has also given rise to significant adjustment costs and structural problems; indeed, UNCTAD (2006: 150) have declared that "the liberalization strategy is generally judged disappointing". As Kozul-Wright and Rayment (2004: 15) note, "the trade performance of the developing countries after the liberalization of the 1980s has been highly uneven, and generally accompanied by a deterioration in their trade balances". Case studies appear to confirm that in countries in which capabilities are least developed, such as in Sub-Saharan Africa, rapid and wholesale liberalisation has contributed to deindustrialisation – measured as the contribution of manufacturing value added (MVA) to GDP – as well as in relation to specific sectors (Shafaeddin, 2005; Khor and Goh, 2006).

Of course, case study evidence "cannot confidently be generalised" (Winters, 2004: F4) and is open to interpretation with respect to the contribution of trade protection and liberalisation versus other context-specific factors. Turning to more systematic quantitative analysis, while it is fairly uncontroversial from cross-sectional studies that more open economies perform better, the direction of causality is unclear: strong performance "would allow imports to be liberalised without generating adverse effects" (Akyüz, 2005b: 18). The more robust panel data analyses have presented mixed results. Greenaway et al. (2002) and Wacziarg and Welch (2008) find evidence of significant, positive effects on growth; these findings are refuted by Sarkar and Bhattacharyya (2005) who employ time-series (cointegration) analysis for India and Korea. Santos-Paulino and Thirwall (2004) find that liberalisation caused the deterioration of liberalising countries' trade balances; Kassim (2013) finds the same for Africa, but their findings are disputed by Wu and Zeng (2008).

Perhaps the most appropriate conclusion is as suggested by Rodriguez and Rodrik (2001: 266) that the relationship between liberalisation and economic performance "is a contingent one,

dependent on a host of country and external characteristics". The problem, methodologically speaking, is that the motivations and capacities of states to implement trade protection effectively may vary systematically between countries, in ways that are not possible to operationalise in quantitative models. Trade policies have given rise to virtuous, cumulative effects by encouraging the attainment of more efficient levels of scale and the formations of industrial agglomerations – thus permitting firms to thrive under more competitive liberal environments – just as they have given rise to vicious cycles of subscale operations, technological sloth, and rent-seeking – thus making adjustment to liberalisation all the more costly.

In any case, to the extent that the weight of evidence suggests overall gains from liberalisation, as suggested by Winters (2004), this finding is only weakly relevant, since the thesis is not concerned with the case for economy-wide trade liberalisation vis-à-vis wholesale protectionism in general, but in relation to sector-specific and time-bound deviations from free trade, the empirical literature on which is clustered around two extremes, neither of which prove definitive. Furthermore, while LCRs have characteristics of trade policies, they have additional specific features relating to state-MNC bargaining aimed at encouraging the establishment of linkages between foreign and local firms, as discussed in the next section.

2.5.3 FDI-led development, advantages, and investment performance requirements

Proponents of the technological capability approach are typically less sanguine than neoliberals regarding the prospects of FDI to promote industrial development. FDI can have a number of beneficial effects on a host country, as well as potential costs; as Moran (1998) discusses in a comprehensive review[11].

However, some of the most important and most controversial implications of FDI relate to the nature of technological spillovers arising from its presence. While it is clearly acknowledged that FDI may be essential to develop capabilities in high tech industries, attracting it is not easy in the first place, and the developmental impact depends, *inter alia,* upon the motivations and strategies of investing firms, the nature of linkages in the activity in which investment takes place, and local absorptive capacities at the firm and national level (Lall and Narula, 2004). There are two channels through which the wider domestic economy can benefit from FDI in terms of technological capabilities: through deliberate 'transfer' through market mechanisms and non-deliberate

[11] In short, FDI can enhance consumer welfare in much the same way as imports by introducing a wider range of goods available at a lower cost; it can contribute to the capital stock in economies where capital is scarce; it may contribute to demand for local goods, services, and labour; and there may be positive dynamic effects arising from enhanced competition on domestic firms. These positive impacts may be offset – to a greater or lesser degree – if FDI gives rise to transfer pricing, repatriation of profits, restrictions on exports of subsidiaries for strategic reasons, crowding out of domestic investment, and foreign influence over domestic political processes (Chang and Green, 2003). These negative impacts are associated with the prevalence of FDI in sectors characterised by imperfect competition (Moran, 1998: 23), which enables MNCs to extract rents from local economies. As Cowling and Tomlinson (2011: 836) observe, "an asymmetry of power exists between transnationals and nations (and regions), deriving from the former's transnationality; in this respect, the strategic decisions made in the interests of transnationals are often unlikely to be compatible with the long term requirements of communities". One of the ways that firms are able to exploit this asymmetry of power is through strategic behaviours which may be termed 'divide and rule': the MNC uses the credible threat of relocation to demand concessions with respect to "measures such as investment subsidies, infrastructural support, employment legislation and tax regimes that will affect the transnational's profitability" while minimising tax liabilities transfer pricing (ibid.). This tendency has been exacerbated as a result of 'globalisation' – as shorthand for the technological developments and an increasingly liberal global policy environment – through which "the competences of multinational enterprises (MNEs) are becoming increasingly mobile and knowledge-intensive [...] [and] [...] the balance in bargaining power has shifted in favour of the MNE" (Narula and Dunning, 2000: 141; see also Dicken, 2003).

'diffusion' through the externalities described above. This is highly relevant with respect to the implications of LCRs, since their justification derives in part from expectations that technology transfer and more intensive learning will result from suppliers' interactions with MNCs in the assembly sector.

A useful first step in analysing the technological implications of FDI is to examine why it should occur at all. Following Markusen (1995), three conditions must pertain in order for FDI to be feasible and desirable from the perspective of a foreign investing firm: the firm must have an advantage in relation to local firms, local production must be preferential to export, and there must be a reason to keep production in house rather than, for example, licensing production to another firm. Thus, FDI is seen to arise as the result of the interplay of three sets of 'advantages' – ownership advantages of MNCs, ownership advantages of domestic firms, and location-specific advantages of countries – which forms the basis of Dunning's (1998) theoretical framework[12] and guides the following discussion.

Firm-specific ownership advantages are assets to which one firm has access and to which competing firms do not. There may be many sources of such advantages – which may or may not be related to multinationality – including proprietary technology, economies of scale and scope in production, and distribution and marketing networks. All of these advantages serve as barriers to entry and upgrading by competitors.

Country-specific locational advantages are the factors which motivate local production on the part of the MNC. These factors are grouped around three main motivations: access to natural resources; access to (protected) markets; and productive efficiency gains. The advantages required to attract market- and efficiency-seeking FDI can be shaped by deliberate state action. As UNCTAD (2000) points out, MNCs tend to favour environments in which they are free to operate in the most profitable manner. However, it does not follow that a laissez-faire policy environment is necessarily most amenable to the attraction and exploitation of FDI from a host country perspective. Because MNCs often operate in imperfectly competitive conditions characterised by economies of scale, they are able to obtain oligopoly rents, and have considerable flexibility regarding strategic and operational matters. As a result, while states want to attract FDI precisely because of the technology it embodies, technological superiority also grants MNCs a wide choice of locations and the capacities to internalise learning processes and exploit asymmetrical market structures in their favour.

There are a number of policy instruments aimed at enhancing the quantity and quality of FDI flows. In a comprehensive review, UNCTAD (1996) distinguishes those relating to admission and establishment; those relating to ownership and control; those relating to operations (i.e. performance requirements); incentives; and investment-related trade measures (i.e. trade policies that affect flows of FDI).

Historically, the location-specific advantage that has been most widely used to attract high-tech FDI into developing countries – in which productive capabilities are relatively deficient – has been the host country's protected domestic market, of which each country has unique possession. The ability to deny foreign investors market access has also provided some leverage to host countries and enabled the imposition of performance requirements (UNCTAD, 2003a: 33).

[12] The framework has subsequently been refined in Lall and Narula (2004) and Narula and Dunning (2000; 2010).

It is important to note however, that even with high levels of protection, without complementary locational capabilities at the national level, inflows of high-tech FDI may be extremely limited (Narula and Dunning, 2000: 160). Transplanting advanced technologies may not be feasible due to the paucity of national technological capabilities, for example with respect to skilled labour, infrastructure and institutions. Furthermore, although by definition FDI involves technology transfer from an MNC to a foreign subsidiary, the nature of the transfer varies with the motivation for investment. As UNCTAD (2000) observes,

> There is an important distinction between investors producing solely for domestic consumption in the host country and investors using the host country as a site (integrated into the global sourcing network of the parents) from which to strengthen their larger competitive position in world markets… there is evidence of a dynamic "integration effect" which provides newer technology, more rapid technological upgrading, best management practices and high industry standards.

As such, while trade protection can provide incentives for inward FDI that may not otherwise occur, it may lead to the 'wrong kind' of FDI if investment is motivated purely by access to the protected market, and not used as a basis on which to reduce costs. In such instances, MNCs may limit the sophistication of technological activity within subsidiaries deliberately in order to exploit obsolete technologies in less competitive market conditions. On the other hand, many developing countries lack the advantages required to attract efficiency-seeking FDI in high-tech, oligopolistic sectors such as automotives; trade protection appears to have been the only feasible option. It should also be noted that FDI projects initially geared towards rent-seeking within a protected domestic market may subsequently be upgraded – by the very same companies – into the 'right kind' of export-oriented facilities, provided that the requisite capabilities and advantages for efficient manufacturing exist, a point acknowledged in Moran's (1998) review of the empirical evidence.

2.5.3.1 Investment performance requirements and state-MNC bargaining

From the perspective of the host country, IPRs (of which LCRs are only one specific type) give valued flexibility in negotiating with MNCs. The mechanisms through which bargains are manifest are the range of policies affecting the profitability of strategic decisions on the part of the investing firm. IPRs typically appear in conjunction with other categories of host country measure, including trade protection and other incentives for production in the terminal sector, entry restrictions, other operational measures, and wider policies and institutions affecting technological learning.

Adherence to IPRs may be rewarded with additional fiscal incentives (or alternatively, non-compliance may be subject to fiscal penalties such as tariff surcharges). Thus, the conjunction of IPRs and other investment incentives, including access to the protected domestic

> may allow a bargain to be struck in which an incentive with high value to the investor and low marginal cost to the host country... is traded for a performance requirement of low marginal cost to the investor but high real or perceived value to the host country (UNCTAD, 2000: 246).

Thus, in cases where FDI has been subject to various forms of incentive – including access to protected domestic markets – IPRs can be seen as integral to a process of bargaining between states and MNCs (Ramamurti, 2001; Kumar, 2001) and as 'reciprocal control mechanisms' (Amsden, 2003). Importantly, operational measures "present many points of contact with

measures meant to regulate the entry and establishment of FDI" and "can constitute preconditions for the investment being allowed in the first instance" (UNCTAD, 2001a: 56). As such, this opens the possibility that IPRs can be "used as screening mechanisms" in the understanding "that it was part of the objective of the government to 'weed out' investments that would not benefit the development of the local industry" (Veloso, 2001: 36). In this context, IPRs are seen as having a useful development role; it is "difficult to see how host countries that have FDI can tap its potential fully without using time-honoured strategies like local content rules" (Lall, 2004: 25).

As previously mentioned, FDI is motivated by different locational advantages. As a result, some countries are in favourable bargaining positions, and may be able to extract some meaningful concessions in order to shape investors' strategic decisions in their favour. In countries with weak bargaining positions, stringent investment rules are likely to be rejected by MNCs, and are more likely to have perverse effects such as discouraging efficient scale or appropriate use of technology. Indeed, the patchy evidence on IPRs (UNCTAD, 2001a; 2003a) suggests that their effects are mixed, and depend upon numerous factors including "the clarity of objectives, the capability of the governments to implement various policies, absorptive capacity in terms of skills of the workforce and strength of domestic enterprises, and the extent to which the measures are compatible with other industrial and trade policies" (UNCTAD, 2003a: 33). In addition, "the ability of a country to use certain requirements depends on its economic importance, mainly in terms of market size" (ibid.). Ultimately, countries often face a delicate balancing act in weighing the potential benefits that can be attained from the imposition of performance requirements against the risk of deterring FDI, or of reducing the quality of the FDI that is attracted" (ibid.: 34).

2.5.3.2 LCRs and assembler-supplier linkages

When MNCs operate within fragmented production processes that characteristic most manufacturing activities, their efficiency depends partly upon the competitiveness of local supply networks. Following UNCTAD (2001c: 133) there are three options for sourcing intermediate goods: importation, in-house production, or local sourcing. Linkages arise when independent firms interact with one another in a specific way: they go "beyond arm's length, one-off relations and involve longer term relations between firms" (ibid.: 127). Because they involve the transfer and diffusion of technology, they are one of the main channels through which local economies benefit from FDI; vertically linked firms often need to coordinate their activities through the continuous mutual exchange of information (Ivarsson and Alvstam, 2005: 1326). Although foreign assemblers may prefer local sourcing for logistical reasons, they are only likely to engage in technical assistance "when it can be expected to yield a return within a reasonable time… even when domestic suppliers are contracted, they are not necessarily given technical assistance" (ibid.: 1327). The benefits of investing in linkages with local firms are often so clear that no government intervention is required. However, in the presence of the technological market failures described above,

> markets may fail to create efficient linkages, raising the cost to both parties of entering into long-term supply relationships and reducing the ability of domestic firms to become competitive suppliers. Failures can arise at several levels. TNCs may be unaware of potential suppliers, or may find it too costly to locate or deal with them. They may be reluctant to invest in building local capabilities because the benefits leak out to other buyers. Local capabilities may be too far below the levels needed to make it feasible for TNCs to invest in improving them. Or domestic suppliers may not have access to technology or finance (UNCTAD, 2001c).

In addition, in the presence of imperfectly competitive markets, foreign firm can exercise monopsonistic power over local suppliers, driving down prices and resulting in suboptimal output levels (UNCTC, 1991: 37). For strategic reasons, MNCs may be reluctant to transfer proprietary technology to local firms or may want to exploit existing sourcing networks (i.e. those in their home region) more fully, thus deliberately overlooking and indeed restricting local opportunities for intermediate production – even when local firms could, in principle, achieve the requisite levels of price and quality. FDI-led development has, for these reasons, often resulted in 'enclaves' exhibiting high import propensities and generating few linkages with upstream local firms (Wade, 2010).

The framework developed above alerts us to potential divergence between socially- and privately-optimal levels of intermediate production and extensiveness of linkages in the context of FDI. The framework thus justifies, in principle, the imposition of LCRs to overcome this divergence. To the extent that LCRs overcome coordination failures in the establishment of linkages and promote the arrangement of more efficient local supply networks, they may represent a low marginal cost to the assembler in the short terms, and in the long term, may give rise to marginal benefits. This depends ultimately on the capabilities of local firms and within the wider economy. Of course, as suggested above, LCRs "do not, by themselves, result in backward linkages, because learning requires domestic firms with the appropriate skills to internalize them, and the conditions which make this necessary" (Narula and Dunning, 2000: 161).

2.5.3.3 Ambiguous effects of LCRs on FDI-led development

By construction, LCRs raise costs for MNCs engaged in assembly operations, at least in the short term. If LCRs serve to protect costly intermediate firms with no prospect that they will become internationally competitive, then they impose a heavy and permanent cost on assemblers. Again, it may be that rents from the protected market still enable profitable assembly operations, but these will be oriented mainly towards domestic demand, and MNCs will only engage in linkages with local firms to the extent required in order to fulfil the LCR. As a result, suppliers – operating at far below global standards of price and quality – are unlikely to become integrated into global supply networks.

On the other hand, to the extent that LCRs overcome coordination failures in the establishment of linkages and promote the arrangement of more efficient local supply networks, they may represent a low marginal cost to the assembler in the short terms, and in the long term, may give rise to marginal benefits. This depends ultimately on the capabilities of local firms and within the wider economy, and also the nature of other locational advantages; even if the LCR is costly to the assembler, this disincentive may be mitigated by access to a (potentially) large market, which *ceteris paribus* will permit greater scale and more efficient production to be achieved in both the assembly and supply sectors – therefore implying that profits will be higher in both sectors – and will encourage MNCs to integrate production into their wider networks. In such a scenario, assemblers are more likely to transfer competent suppliers with appropriate technology.

At the same time, LCRs enhance location-specific advantages for the attraction of market-seeking FDI in the intermediate sector. This potentially important point has been neglected in much of the literature; LCRs are considered as a tool to extract concessions from mobile foreign assemblers, the technological assets of which may diffuse to local suppliers. This scenario may approximate the circumstances in which LCRs were initially implemented in the automotive sector, but increasingly appears outdated; global suppliers operate with similar levels of scale, geographical reach, and technological assets, as I describe in chapter 3. As a result of these changes in the

'governance' of automotive value chains, assemblers are not the only means through which developing countries can access advanced technology and thus promote the efficiency of their supply industries. To the extent that countries may have serious difficulties attracting FDI in the absence of protection, LCRs may help to overcome the costs and uncertainties of the establishment of foreign subsidiaries in the intermediate sector.

Thus, the elimination of LCRs has restricted two important mechanisms of FDI-led development: LCRs as a form of direct protection used to attract multinational market-seeking investment in the supply sector; and LCRs as a means with which to extract concessions from MNCs in the assembly sector, in conjunction with other incentives.

Ramamurti (2001) argues that the multilateral liberalisation of TRIMs has reduced states' bargaining power vis-à-vis foreign capital by constraining the scope of 'micro' negotiations between the state and individual firms. The distributional effect of this phenomenon is inherently ambiguous, although it is likely to be experienced asymmetrically across countries with different locational advantages. In the first place, more advantageous locations are less likely to exhibit the types of market failures that require correction in the first place. Secondly, they are more likely to thrive in the more liberal environment, since both market- and efficiency-seeking FDI may be diverted from less advantageous locations. The ability to confer artificial (policy) rents is being eroded as a source of bargaining strength while advantages based on market size and production costs are becoming more important, with "far-reaching consequences, particularly for industries not yet able to compete in world markets" (Narula and Dunning, 2000: 159).

On the other hand, countries with weak bargaining positions are less likely to be able to extract meaningful concessions from MNCs anyway; and in many cases, are likely to lack the state capacities to effectively design policies in order to overcome rent-seeking lobbies (see Benhassine and Raballand, 2009). From this perspective, multilateral restrictions are more beneficial to weaker countries, who are undoubtedly "on an unequal footing in playing the game of strategic trade" (UNCTC, 1991: 40). There is an apparent paradox: "in poor country contexts where interventions are probably needed most the conditions under which these can be implemented successfully are lacking… there is no way to say ex ante" how the costs and benefits of multilateral restrictions on LCRs balance out, in terms of their distribution across structurally diverse countries (Benhassine and Raballand, 2009: 306).

2.6 SUMMARY OF FINDINGS, GAPS, AND IMPLICATIONS FOR ANALYSIS

2.6.1 Overview of the existing literature

The theoretical literature on the impacts of LCRs is mixed. In some instances, LCRs can be effective in correcting distortions arising from imperfectly competitive markets and external effects arising from technological learning and the establishment of linkages; in others, LCRs exacerbate distortions, reduce welfare, and lead to the perverse outcomes in which local intermediate production is lower than in the absence of the policies.

Empirical evidence on the implementation of LCRs confirm that they have given rise to positive or negative effects, depending on the circumstances in which they have been implemented. The evidence suggests that market failures are pervasive in high-tech and productively-fragmented activities, but that industrial policies, including LCRs, are often unsuccessful. The contribution of specific structural conditions and policy design features to the effects of LCRs, how rarely these occur, and the likelihood that government intervention can improve matters, are all highly

contested. Short of a "micro-level, cost-benefit examination" of each and every intervention (UNCTAD, 2001a: 59), the impacts of LCRs, and thus the potential cost of their removal, appear inherently ambiguous. But this conclusion leaves an important substantive gap in the literature for the concerned public policy analyst: the implications of eliminating the flexibility of (especially developing) countries to implement such policies, and how the costs and benefits tend to vary in different circumstances, in relation to capabilities, advantages, and market structures that permit the improvement of outcomes in the presence of market failures.

2.6.1.1 Market failures

The desirability and effectiveness of LCRs are seen to depend upon the magnitude of market failures in terms of

- imperfectly competitive markets (which provide a rationale for LCRs based on rent-shifting arguments);
- costs and uncertainty associated with dynamic 'learning-by-doing' and increasing returns to scale in domestic firms and with multinational suppliers engaging in FDI in new locations (which provides a rationale for LCRs as temporary trade protection);
- spillovers and coordination failures associated with technology transfer between assemblers and suppliers (which provides a basis for LCRs to encourage backwards linkages).

In short, market failures of these types may lead to underinvestment and suboptimal output levels in the supply sector, the correction of which may result in welfare improvement, both domestically and globally. However, the extent to which LCRs correct or exacerbate market failures is highly variable, and depends upon a host of structural characteristics (capabilities and advantages) at the firm and country level, the manner in which the policy is designed and implemented, and its conjunction with wider policies and institutions.

2.6.1.2 Static and dynamic effects on industrial performance

In order to fully examination the mechanisms of causation, the static and dynamic (or short- and long-term) effects of LCRs on industrial performance must be distinguished. Turning to static effects first, for a given level of exogenously-determined demand and abstracting from the decisions of assemblers to produce in the domestic market, LCRs would be expected to increase production in the intermediate sector, whether via local firms or FDI. Local intermediates would displace a proportion of imports. The impact on export performance, and hence overall trade balance, would be ambiguous. On the one hand, suppliers would face greater incentives – via protective rents – to produce for the domestic market, and would tend to shift from exporting to import-substituting production. On the other hand, the increase in output could lead to greater utilisation of scale, increased productive efficiency, and higher export levels.

Of course, there are good reasons to assume that LCRs would actually affect the level of demand for domestic inputs via effects on the assembly sector. Assembly firms required to purchase local content would bear an additional cost, and would be discouraged from domestic production and investment, although this cost could potentially be offset by rents by other incentives and strategic advantages associated with investment (WTO/UNCTAD, 2002: 24).

However, even with these compensations, finished automotive products would be more expensive, reducing domestic demand and foreign exports. The impact of these demand-side considerations would be to reduce intermediate output, potentially leading to diseconomies of scale, reduced productive efficiency, and lower intermediate exports. As a result, even the static effects of LCRs on production, investment and trade are ambiguous, and depend upon the relative

elasticities of demand for intermediate and final goods, market structures in each sector, and the conjunction of LCRs with other conditions affecting the performance of the terminal sector.

Turning to dynamic effects, in the familiar infant industry argument, protected firms may engage in 'learning by doing' – essentially benefitting from a series of dynamic technical spillovers. Under such conditions, LCRs should encourage upgrading and capability development; over the course of the policy's implementation, firms should travel down their long term cost curve, leading to an increase in output and a shift from import-substituting to export-oriented production. Rents arising from the protected market and increased revenue from foreign sales could be reinvested to further upgrade technology, diversify output, and reduce costs. In addition, other firms – both producing finished goods and parts and components – will be attracted to the location, further contributing to a virtuous process of positive feedback through the establishment of inter-firm linkages and generating technological and labour market spillovers. Faced with LCRs, assemblers may be more inclined to transfer technology, in order to upgrade local firms' or subsidiaries' production systems and thus reduce their own supply costs.

A more pessimistic picture of the dynamic impacts of LCRs can also be envisaged. In the negative scenario, firms engage in rent-seeking behaviour, devoting themselves wholly to supplying the protected market; shielded from foreign competition, they fail to make sufficient investments in technology or achieve the requisite scale to become internationally competitive. Therefore, if "the costs of local production of components remain high behind the protection of the LCR, the risk is that the entire domestic industry, including the production of finished goods, will remain uncompetitive" (WTO/UNCTAD, 2002: 22). Assembly firms may leave the industry, and domestic demand will drop due to prohibitive costs. LCRs may discourage transfer technology, or may encourage the transfer of suboptimal technology, due to the small scale of the market that suppliers serve. The result is a vicious circle of technological retardation, sub-scale production, increased pressure from import competition, and reduced export levels.

As such, as observed by WTO/UNCTAD (2002), dynamic effects of LCRs are "more speculative", because they depend upon the nature and magnitude of market failures in technological capabilities, as well as the strategic decisions of MNCs with respect to production and sourcing, which are characterised by stickiness, imperfect information and substantial costs. Both of these determinants – market failures and firm strategies – are critically related to the concepts of capabilities and advantages, which vary at the country and firm levels, and provide an explanatory framework for interpreting the likely implications of the elimination of LCRs.

2.6.2 Conceptual and theoretical framework: the impacts of LCRs in the presence of cumulative and conjunctive causation

The framework developed in the course of this chapter suggests that LCRs should be implemented only in specific circumstances: in the presence of imperfectly competitive market structures, in which assemblers accrue oligopoly rents, and when market failures prevent the emergence of competitive suppliers. Furthermore, the effectiveness of LCRs will depend upon capabilities and advantages of local firms and in the wider economy; if technological capabilities are strong, and the prospects for demand are good, then MNCs will be less reluctant to transfer technology and local firms will be more capable of rapidly moving up learning curves to produce intermediate goods more efficiently, thus giving rise to virtuous circles of cumulative causation. The conceptual and theoretical framework underlying my approach is depicted in figure 2-1, below.

In the conceptual and theoretical framework developed here, I have identified three main factors in conjunction with which the effects of the implementation and elimination of LCRs on industrial performance outcomes are determined. These factors, and their influence on industrial

performance outcomes, are summarised below. In combination, these factors determine whether the context for the implementation of LCRs is advantageous or disadvantageous, and thus how the causal mechanisms of firm-level responses to the local content regime inform industrial performance outcomes. The framework shows the mechanisms through which the implementation of LCRs may give rise to virtuous or vicious cycles of causation.

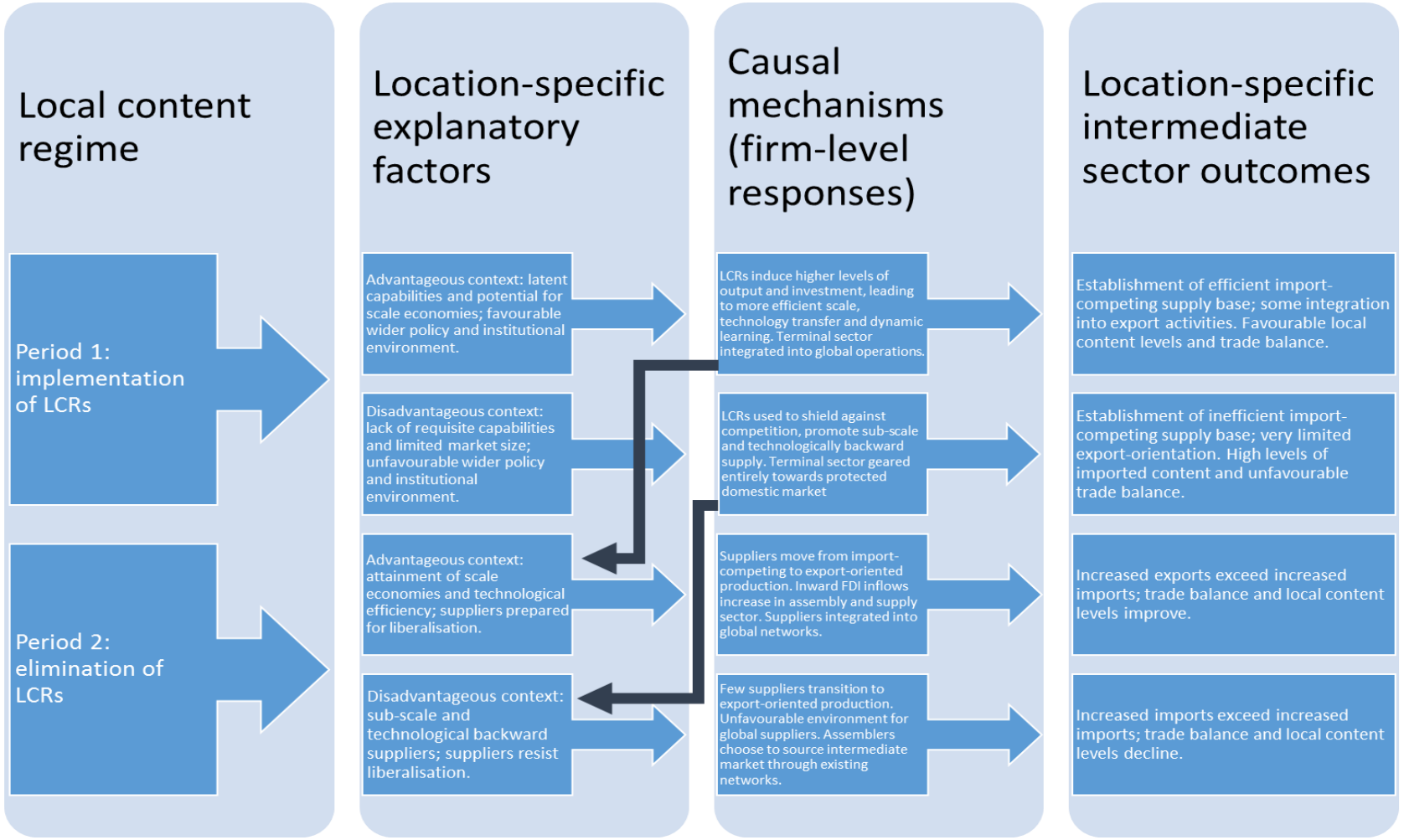
2.6.2.1 National capabilities

Capabilities are crucial for technological learning as well as absorption of foreign technology. Obviously, domestic firm-level intermediate sector capabilities are likely to be deficient almost by definition, since otherwise LCRs would be redundant. If they are too distant from the technological frontier, then assemblers – on which the domestic firms may be reliant for technology – will be neither willing nor able to assist them to achieve productive efficiency. Furthermore, assuming that global suppliers can respond to the rents afforded by LCRs to establish local production facilities, they would still require the presence of complementary skills and resources in the wider economy. Therefore if national capabilities – i.e. skilled labour, technological institutions and infrastructure – are also deficient, neither domestic nor foreign intermediate firms would be able to achieve efficient production runs, regardless of protective rents. Just as importantly, multinational assemblers might be reluctant to establish full-scale and technologically up-to-date plants unless they were able to produce vehicles of the requisite price and quality demanded to achieve international competitiveness. Instead, both assemblers and suppliers would reorient their strategies towards maximising their rents in the protected domestic market. The strong presence of capabilities, on the other hand, increases the returns and reduces the costs of learning, technological absorption, and technology transfer. As a result, LCRs are likely to be effective in instances where there are 'latent' capabilities close to those prevailing in globally-competitive firms which are prevented from emerging due to market failures, and thus when capabilities can feasibly be acquired within a reasonable timescale and at reasonable cost.

2.6.2.2 National market size

In addition, if the stringent scale requirements in the sector are ignored, LCRs are unlikely to lead to the emergence of a competitive supply sector, but instead, exacerbate inefficiency. Another major determinant of whether effects are positive or negative, and whether efficient intermediate production can emerge, therefore, relates to scale – especially to the extent that technological capabilities are subject to market failures exacerbated by internal and external economies of scale. The attainment of efficient levels of scale may be feasible if suppliers are able to orient towards export markets, as mentioned above. However, domestic market size is very likely to be an important determinant of the scale of plants. For a start, transport and logistical costs provide some 'natural' protection for domestic production. Furthermore, in many cases in which LCRs are applicable, domestic production of the final good itself will be motivated by access to a protected domestic market.

Figure 2-1: Heuristic framework of the effects of the implementation and elimination of LCRs in the presence of conjunctive and cumulative causation



Since demand for intermediates is derived from final good demand, larger volumes of final good production permit more efficient realisation of scale economies. The smaller the market, the greater the cost penalties for suboptimal levels of scale, and the more assemblers have to be compensated via protection and subsidisation to ensure that domestic production remains feasible. Of course, if markets were sufficiently large to permit efficient levels of scale, the need for protection would largely disappear. As with technological capabilities, the market size commensurate with the effective use of LCRs is such that some protection is required to overcome market failures and make domestic production (more) feasible in the short term, but with sufficient potential for growth that efficient levels of scale may be achieved fairly quickly, in line with dynamic learning processes within and between firms.

2.6.2.3 Policies and institutions

As noted above, LCRs are but one policy affecting the operational decisions of firms; the impact of LCRs is likely to be codetermined by how the combine with other policies and institutions that affect the profitability of different operational decisions. It is difficult to know, based on the limited evidence available, precisely which policies should be introduced alongside LCRs in order to maximise their beneficial effects; in any case, this is likely to vary with the context in which interventions are taking place, such as the nature of market failures and governance structures in specific sectors, and the latent capabilities and advantages in the wider economy. Nevertheless, one cannot avoid the conclusion that if the wider policy and institutional regime is heavily and permanently biased against export-oriented production and/or foreign investment – and does not adequately incentivise technological capability development through a competitive environment – then LCRs are likely to interact with these conditions perversely. On the other hand, if LCRs are introduced as part of a broader drive to achieve upgrading within a process of sequenced trade protection in which local and foreign firms are encouraged to integrate in wider global networks of production then arguably, they are more likely to be effective.

2.6.2.4 Causal mechanisms

The causal mechanisms through which capabilities and advantages interact to determine industrial performance outcomes are the strategic decisions of MNC lead firms, MNC parts suppliers, and local firms. These mechanisms include decisions pertaining to the economic geography of production, trade and investment, such as on:

- the location of investments (including acquisitions of and mergers with local firms);
- the transfer and licensing of technology;
- the nature of activities or tasks (e.g. marketing, manufacture, research and development);
- whether to produce for the domestic or export market; and
- intra-firm trade and sourcing of inputs.

The distribution of advantages within and between MNCs and states forms the context under which such decisions are made, the extent to which states can extract concessions without deterring investors, and the extent to which trade protection and investment restrictions give rise to virtuous or vicious cycles of industrial development.

2.6.3 A gap for empirical research into the impacts of the elimination of LCRs on industrial performance outcomes

As a result of the complex determinants of the effects of the use of LCRs, and how they pertain to countries with different capabilities and advantages, the effects of eliminating LCRs are similarly ambiguous. So far, I have examined the effects of the prohibition of LCRs indirectly, by

investigating literature on the observed effects of their implementation and the theoretical determinants of their effectiveness, under the assumption that prohibition proscribes those impacts, whether positive or negative. Apart from the fact that the theoretical and empirical record are ambiguous, as summarised above, this strategy does not permit investigation of the process of liberalisation itself. In this context, one of the crucial determinants of the impact is the extent to which the countries (and firms) involved were prepared for adjustment to a more liberal environment, and thus the sequencing of liberalisation with respect to their advantages and capabilities. Nor does my the analysis based on the existing literature allow for the multilateral nature of the restriction, to the extent that liberalising countries have simultaneously been exposed to reciprocal liberalisation in trade competitors.

I have thus identified a gap for applied empirical work into the causal effects of the elimination of LCRs on the countries that were compelled to remove them as a result of the exogenous restriction on policy space. In this regard, there are two potential sources of inequality arising from the elimination of LCRs, into which empirical examination are both warranted and feasible.

There are two main ways which the elimination of LCRs affects countries: the effects of domestic liberalisation (i.e. elimination of LCRs in countries in which they are in force) and the effects of liberalisation abroad. There is the inequality arising from the nature of the rules, since some countries have had to eliminate LCRs as a result of the TRIMs Agreement while in others the prohibited instrument was not in force. Eliminating a potentially developmentally-useful policy, even if it may give rise to negative effects in some (or even most) circumstances, disproportionately constrains the policy space of countries which are most extensively affected by the types of market failures described above. On the other hand, if one accepts that such policies are more systematically misused in countries in which market failures are pervasive and in which capabilities and advantages are weakest, then *de jure* policy restriction may actually expand development policy space. As a result, the nature and extent of the inequality between the two groups are ambiguous. Therefore, my preliminary enquiry relates to an examination of the presence, nature and extent of divergent impacts, over time and between these two groups.

The second source of inequality relates to the divergent structural characteristics in the countries subject to policy space restrictions. Countries with existing capabilities and advantages at the time of liberalisation will be better placed to cope with the increased import competition, attract efficiency seeking FDI, and expand output and exports. Relatedly, the effects of the elimination of LCRs will be experienced asymmetrically by firms with diverse capabilities and advantages. Countries populated by firms in which capabilities are lacking may experience adverse effects as measured by macro-level performance indicators, unless liberalisation is accompanied by rapid upgrading within local firms and/or inward investment by larger, more capable suppliers. The conceptual and theoretical framework developed in the course of the present and previous chapters suggests that one of the crucial determinants of the impact is the extent to which the countries (and firms) involved were prepared for adjustment to a more liberal environment, and thus the timing and sequencing of liberalisation with respect to their advantages and capabilities. In order to examine the nature of these divergent impacts, it is thus necessary to compare the effects of liberalisation across structurally-diverse countries within the group of countries that have been compelled to remove their LCRs.

The ways in which the nature of these inequalities can be feasibly examined through empirical work, is the subject of the following chapters. First, I examine the empirical context in which LCRs have been most prominently used: the automotive parts and components sector.

As I have argued, the precise nature of the effect of LCRs and their elimination will depend upon the technological and logistical characteristics of productive processes, and the extent to which technology transfer is feasible and desirable, which vary according to the sector in which LCRs are targeted. In this context, the global value chain (GVC) approach contributes an important analytical framework for analysing the effects of the elimination of LCRs empirically, by analysing the organisational structures of multi-stage production systems and the phenomenon of productive fragmentation, and their implications for industrial development outcomes. This is the approach which I adopt in the following chapter.

3 EMPIRICAL CONTEXT: THE ROLE OF LCRS IN THE GLOBAL AUTOMOTIVE VALUE CHAIN

3.1 CHAPTER OUTLINE

In the previous chapter, I examined the literature surrounding the purpose and implications of LCRs generically. I argued that the effects of LCRs would depend on the nature of technological accumulation and linkages, which, I suggested, varied with the structural characteristics of individual countries, including the capabilities, advantages and wider policies and institutions affecting production and consumption, as well as the idiosyncratic, 'techno-economic' features and market structures of specific sectors which determine the nature of linkages and distribution of capabilities and advantages among firms in the intermediate and terminal sectors.

In terms of the prohibition of LCRs, I hypothesised that effects on individual countries would depend upon whether exogenous rules restrictions required LCRs to be eliminated or not, as well as the aforementioned factors. The conceptual and theoretical framework adopted explicitly incorporates complex (conjunctive and cumulative) processes of causation, such that the effects of liberalisation are codetermined by the timing and sequencing of the policy change with respect to the accumulation of capabilities and the establishment of linkages arising in the period of protection.

As I have already acknowledged, the precise nature of these dynamics are likely to be highly specific to individual sectors. In a review of the evidence for investment performance requirements, UNCTAD (2001a: 59) acknowledge that existing empirical analysis is limited because measures are "are applied in different industries, where their influence varies greatly". In such a context, comparing the effects of the elimination of LCRs in more than one sector is like comparing apples and oranges. However, as LCRs were used overwhelmingly in the automotive sector to support domestic intermediate goods producers, and because it is possible to identify instances in which this is the case, I am able to isolate the impact of the elimination of LCRs on performance outcomes in this narrow subsector, in which there are (relatively) few confounding factors, compared to the determinants of industrial performance more broadly or across multiple sectors. Therefore, the empirical setting[13] in which I examine the effects of the elimination of LCRs is the automotive sector, with my operationalisation of performance outcomes restricted to the parts and components subsector.

The present chapter therefore applies my generic conceptual and theoretical framework to the concrete circumstances of the automotive parts and components sector, in which LCRs have been historically pervasive. The chapter has two important functions in the thesis, empirical and analytical. Empirically, the chapter serves to summarise the insights of existing secondary literature on the role of the state in shaping the development of the automotive sector, especially in emerging markets, and with a particular focus on the role of LCRs in promoting the emergence of domestic supply sectors. Since the existing literature does not settle the important questions I

[13] The process of identifying an appropriate empirical setting is analogous to case study selection as described in some of the methodological literature (e.g. Rohlfing, 2012), but I avoid this term to avoid confusion with subsequent discussion of variable- and case-oriented research, in which I position countries as cases. Another way of looking at this is in terms of different stages of empirical analysis – panel regression and country case studies – 'nested' within an overarching case study of the prohibition and elimination of LCRs in the global automotive sector.

have set out to address, partly due to methodological difficulties, the chapter also serves as a basis for the operationalisation of the conceptual and theoretical framework that pertains to the subsequent empirical analysis.

The chapter is structured as follows. In section 3.2, I summarise the key features of the global value chain approach. In section 3.3, I provide an overview of the factors driving automotive parts and components sectoral development in different locations and highlight the key features of automotive governance structures. In section 3.4 I provide an historical overview of the ascendancy of the core 'triad' regions of production, and the geographic spread of production to emerging regions. Section 3.5 assess the effects of automotive trade policies generally, and of LCRs specifically, arguing that they have ultimately been mixed. I conclude that there is an opportunity for systematic, cross-national research into the elimination of LCRs, provided that it is possible to operationalise factors affecting the economic geography of production, trade and investment of the parts and components sector, both independently and in conjunction with LCRs. In section 3.5.4, I identify the countries for which the TRIMs agreement has necessitated the elimination of LCRs previously applied in the automotive sector. Section 3.6 provides an overview of capabilities, advantages, and policies and institutions, as well as the evolving features of automotive governance, that codetermine industrial performance outcomes at the country level.

3.2 THE GLOBAL VALUE CHAIN APPROACH

Before turning to the specificity of the automotive sector and the determinants of national parts and components performance outcomes, I briefly outline the core concepts of the GVC approach in a generic manner.

3.2.1 Governance and the role of lead firms

The most important concept is governance, which describes the nature of linkages between different stages in a value chain. Governance has characteristics relating to organisation of linkages between different activities, the distribution of ownership-specific advantages, market power and rents across firms, and the geographical location of activities, all of which are interrelated. Although I am essentially concerned with performance in different geographical locations (in relation to the use and elimination of LCRs), these characteristics are all relevant to the extent that they affect the feasibility of supply, the relative advantages of local and multinational firms, and the manner in which suppliers are integrated into wider production systems, across different localities.

Organisationally, governance is concerned by how the activities that comprise the value chain are linked – whether they are carried out by different firms or internalised vertically, and the nature of the linkages between firms and subsidiaries in terms of how activities are coordinated. These organisational characteristics are related to the distribution of capabilities and advantages across different actors within the value chain. A main concern of the GVC approach is how governance structures reflect asymmetries in firms' capacities to accrue value within different functions: 'rents' accrue at different stages of the chain, when there are high barriers to entry as a result of capability requirement or "whenever non-competitive structures emerge and the balance of power is unevenly distributed among actors" (Pietrobelli, 2007: 10). The approach is thus congruent with the technological capability approach, which usually implicitly adopted as the conceptual and theoretical basis of GVC analysis (Humphrey and Schmitz, 2002; Humphrey, 2004; Gereffi et al., 2005; Pietrobelli, 2007).

Thus, ownership-specific advantages – in terms of capabilities and market power – determine the extent to which firms are able to exclude other actors from valuable activities and coordinate governance structures in order to maximise their own share of total rents. Those in a dominant position are termed 'lead' firms, in the sense that they coordinate the activities of subordinate upstream and/or downstream firms. According to Sturgeon's (2001: 11) definition, lead firms are distinguished by their initiation of the "flow of resources and information through the value chain by developing and marketing final products" and suppliers are "connected to those activities that arise as a response to the impetus of lead firms" (ibid.).

The GVC approach has thus illuminated the numerous ways in which lead firms are able to coordinate supply through different modes of governance, ranging from 'arms-length' relationships with independent firms, via contractual and cooperative relationships with independent firms and joint ventures, to fully 'in-house' production. In his early formulations, Gereffi (1999) distinguished buyer-driven sectors such as apparel – in which lead firms acquired advantages in design, marketing, branding and sales, but outsourced labour intensive and low-value productive activities – and producer-driven sectors such as automotives, in which lead firms established advantages through barriers to entry into productive activities arising from the sophistication of proprietary technology and the exploitation of scale economies. The extent to which suppliers are able to capture rents within the value chain depends on their capabilities and advantages in relation to those of lead firms; their relationships with lead firms can be distinguished based on the nature of power asymmetries and have been labelled as hierarchical, captive, relational, modular, and market forms of governance (Gereffi et al., 2005). Besides the distribution of advantages between lead firms and suppliers, the organisational features of governance depend upon the idiosyncratic features of the value chain, in terms of the complexity of technology and the extent to which it may be codified (ibid.), and risks involved with the dissipation of technological advantages.

3.2.2 Location-specific determinants of the economic geography of production, trade and investment

Geographically, activities are distributed according to the interplay of location-specific economic, technical and logistical (market) factors on the one hand and policy, institutional and political (non-market) factors on the other. As such, the GVC approach is congruent with historical institutionalist approach to causal explanation, discussed in the following chapter as I consider my methodological options, to the extent that "institutions – labor unions, industry associations, legal and cultural norms, industry specific standards and conventions, etc. – matter. The rules set by states and multilateral organizations matter" (Sturgeon et al., 2008: 298). Furthermore, the processes of cumulative causation and positive feedback, and an understanding of the ways in which history shapes future configurations of industrial structures, feature heavily in the GVC approach: "events are almost always, to some degree, constrained by path dependence and determined by feedback loops of both the positive and negative kind" (ibid.).

The geographic nature of linkages in multi-stage industries is characterised by two (apparently) conflicting market forces: clustering (i.e. exploitation of agglomeration economies in single locations) and fragmentation (i.e. task-based specialisation enabling exploitation of differential relative cost structures in different locations) (WTO, 2008) which vary by location as well as by activity. Factors that drive clustering include significant transport and logistical costs, the presence of specialised labour markets and the pertinence of exchanges of tacit knowledge linking different stages of production (Sturgeon et al., 2009: 299). To the extent that these factors are prevalent, they suggest that suppliers will be located in close proximity to assemblers (and by extension, to

sources of demand). On the other hand, fragmentation is driven by "new transport and communication technologies that cut the costs of international integration" and facilitated by trade and investment liberalisation (Lall et al., 2004: 3). Fragmentation permits intermediate production to be carried out in the most advantageous locations, for example in relation to lower labour costs or existing capabilities, and the actualisation of internal scale economies, rather than in close proximity to firms engaged in upstream and downstream activities. The feasibility of intermediate fragmentation depends, *inter alia*, upon the extent to which technological specifications and other communications may be codified and transferred to distant locations, and the value to weight ratio of the product in question.

The opportunities for agglomeration and geographical fragmentation depend upon conditions of supply and demand in specific locations – what I have termed location-specific advantages – as well as non-market factors. To the extent that agglomeration economies are prevalent, there will be a tendency for suppliers to locate close to assemblers; a critically important advantage in relation to supply performance, therefore, is terminal sector production (and by extension, determinants thereof, including domestic and regional demand and policies and institutions that provide incentives for assemblers to serve local markets through FDI). At the same time, to the extent that fragmentation is feasible, there will be a tendency for suppliers to locate in the most cost-effective locations; the most critically important advantage in this regard is the existence of industrial or productive capabilities (and determinants thereof), which allow firms to reap internal economies of scale and supply multiple locations at distance. Of course, to the extent that the two sets of advantages reinforce one another, the emergence of integrated domestic market- and export-oriented production hubs is feasible; indeed, a number of emerging markets are attractive precisely because they offer the combination of rapid demand growth and lower operating costs. Furthermore, as Sturgeon et al. (2009: 302) observe, "local and distant linkages are not mutually exclusive, but part of a nested and increasingly integrated spatial economy that involves cohesion at all spatial scales, local, national, continental and global".

This statement connects profoundly to the 'nested' nature of automotive value chain governance, as I describe in section 3.6 below, which has also arisen in response to non-market determinants. Besides emphasising policies at the national level (of which tariffs on final goods and LCRs are prevalent examples), policy and institutional factors also pertain at the sub-national and regional (supra-national) levels. Thus, the GVC approach provides a nuanced account of contemporary industrial development by situating the overarching processes of globalisation and the strategies of lead firms and suppliers within local and regional specificities.

3.3 DYNAMICS AND DRIVERS OF AUTOMOTIVE PARTS AND COMPONENTS PERFORMANCE: THE AUTOMOTIVE VALUE CHAIN IN HISTORICAL PERSPECTIVE

Factors 'driving' the process of automotive industrialisation in developing countries can be characterised in a number of ways; I borrow from Humphrey et al. (2000) and Wad (2009). Humphrey et al. (2000: 13) identify three main sets of factors: the strategies of the leading automotive companies, policies adopted by governments, and the specific features of demand and production in emerging markets. Wad (2009: 175) suggests a similar set of explanatory factors – strategies of lead firms and suppliers, automotive policy regimes, and the "overall political economy" – emphasising their complex and 'multileveled' interaction.

Combining these schemes with the generic framework outlined in chapter 2, it is apparent there are three main areas of locational advantage at the country level which affect automotive sector development in emerging markets: market size, growth and potential; industrial (and/or

technological) capabilities; and the policy and institutional environment. In addition and relating to these factors are the idiosyncratic features of value chain governance and market structures, and the capabilities and advantages of assemblers and suppliers, both local and multinational.

3.3.1 Governance features of the automotive value chain

The automotive sector governance has traditionally been characterised by a tiered system in which producers of finished vehicles – variously termed 'assemblers', 'automakers', or 'original equipment manufacturers' (OEMs) – act as 'lead firms' and use their market power and proprietary technology to coordinate the activities of subordinate parts and components suppliers. OEMs have established complex networks of supply, incorporating in-house production through subsidiaries and various forms of joint venture with independent capital, relationships with independent suppliers forged in their home country or region, and independent local suppliers in the host countries in which they operate.

Independent suppliers, which are typically referred to as belonging to first, second or lower tiers based on the nature of their relationship to the assemblers and their degree of technological competence, "have historically provided parts and sub-assemblies according to the design specifications spelled out by the OEM" (Sturgeon, 2001: 11). The starting point for our analysis, therefore, is that parts and components production has historically emerged as a subordinate activity that has been controlled by vehicle manufacturers in their role as lead firms. Performance of the parts and components subsector in developing countries is intimately linked to the manner in which supply firms are positioned in fragmented production processes and wider (regional and global) strategies of lead firms[14] based in the triad regions (North America, Europe and Japan).

As discussed below, more competent independent suppliers are assuming greater levels of responsibility and engaging in more advanced and valuable activities. Indeed, the entire automotive value chain is in the midst of profound change. Global competition, technological change and trade and investment liberalisation have driven consolidation in both the terminal and supply sectors, threatening less capable firms. At the same time, emerging markets have become vastly more significant, strategically speaking, to lead firms and suppliers alike. The most capable suppliers have established a global presence, following assemblers to rapidly growing emerging markets, and outsourcing aspects of production to areas with lower operating costs.

I will argue that the impact of these trends, in conjunction with the elimination of LCRs, is both to exacerbate threats and enhance opportunities for the establishment of competitive parts and

[14] The types of governance that have emerged have had firm-specific characteristics (Veloso and Kumar, 2002) as well as varying with the region of the lead firm's origin (Wad, 2008), and changing over time. These governance structures have reflected the historical conditions in which lead firms have sought to capture value. Specifically, US firms have historically integrated supply systems in hierarchical and market-based governance systems in order to exploit their market power as buyers of parts and components in arms-length relationships, while maintaining the most important and technologically sophisticated aspects of production in house. European automakers, which emerged in the conditions of smaller, nationally fragmented markets, have similarly exercised tight control over suppliers but have also engaged in more relational, horizontal forms of governance in which suppliers have developed their own, independent capabilities and serve numerous customers; this has enabled greater economies of scale in production than if suppliers served individual OEMs. Finally, Japanese firms have engaged in more cooperative and long-term relationships with suppliers (ibid.: 55-56). The difference between Japanese and Western governance structures, in terms of "the form and practice of relationships" has historically been the most significant (Maxton and Wormald, 1998: 97). Regardless of the specific governance structures, it is undoubtedly the case that "their huge purchasing power means that each lead firm can force suppliers to accommodate its idiosyncratic standards, information systems, and business practices" (Sturgeon et al., 2008: 308).

components industries depending upon structural characteristics – capabilities and advantages – at the national level. However, the precise nature of the impact of the elimination of LCRs requires systematic, cross-national comparison controlling for the myriad determinants of the economic geography of production, trade and investment in the parts and components sector.

3.3.1.1 Economic and technical determinants of automotive value chain governance structures

One of the distinctive features of the automotive sector is "its extremely concentrated firm structure: a small number of giant companies exert an extraordinary amount of power over smaller firms" (Sturgeon et al., 2009: 9). The high degree of concentration is unsurprising given the economies of scale that characterise production in the industry. Husan (1997) documents the sources of scale economies and estimates the magnitude of cost penalties incurred when operating below 'minimum efficient scale'. For assembly, empirical estimates of minimum efficient levels of scale range from around 100,000 to 300,000 units per annum; in combination with the scale requirements for steel forging, pressing and powertrain manufacture (i.e. manufacture of the largest, most important components), which are retained in-house, only a small number of firms achieve minimum efficient scales (in 1997, Ford and GM in the US, Toyota and Nissan in Japan, and VW, Fiat and PSA in Europe). The author suggests that minimum efficient scales are likely to have increased over time as production processes become more capital and technology intensive. The cost penalties that arise from sub-scale production are high; for example, operating at 10% of the minimum efficient scale incurs a penalty estimated at around 35% (ibid.: 41).

As previously discussed, the economic geography of governance structures is characterised by tendencies towards agglomeration and fragmentation. Logistical and transport costs have always provided strong techno-economic incentives for production near to sources of demand, to upstream and downstream firms within fragmented production processes, and to complementary inputs in the production process, which include capabilities in local firms and in the wider economy. For this reason, even in the absence of trade and industrial policies such as tariffs on finished vehicles and LCRs, manufacturers may still face incentives to assemble complete vehicles close to their final markets and incorporate a high proportion of local content, especially of larger parts[15]. Coupled with the phenomenon of scale and agglomeration economies, this "reinforces the disadvantage experienced by relatively small manufacturers in 'low-demand, low-output regions" (Husan, 1997). In addition, there are external or agglomeration economies that emerge from the close proximity of different stages of production, that permit more efficient linkages to be formed through the provision of direct technical assistance to address quality issues and the synchronisation of assemblers' and suppliers' production schedules (Humphrey and Salerno, 2000: 158-9). Local sourcing thus "allow for closer monitoring and give a larger flexibility in changing specifications and developing new inputs" (Ivarsson and Alvstam, 2005: 1327).

At the same time, this tendency for suppliers to cluster in close proximity to assembly plants will be diminished in the case of parts with high value to weight ratios, such as electronic components, to the extent that alternative locations provide opportunities to reduce unit

[15] Whether parts can be feasibly imported, or whether they must be produced close to the point of assembly, depends on their logistical features as well as their technological and scale requirements in comparison to local capabilities. According to Sturgeon and Van Biesebroeck (2011), "bulky, heavy, and model-specific parts-production [is located] close to final assembly plants to assure timely delivery (for example, engines, transmission, seats and other interior parts), and lighter, more generic parts [are] produced at a distance to take advantage of scale economies and low labour costs (for example, tyres, batteries, wire harnesses)".

production costs – for example as a result of superior productive capabilities or cheaper labour – and attain greater scale by orienting production towards external markets. Trends towards productive fragmentation are enhanced by falling transport costs, technological advances that allow linkages to be coordinated at distance, and trade liberalisation.

Of course, vehicles are typically composed of thousands of parts and components, each with varying degrees of technological complexity and efficient levels of productive scale. Some of these activities are fairly unsophisticated, with low barriers to entry and low value added and others may be more limited in terms of the requirements for efficient levels of scale. As Doner (1991: 224-225) reports,

> The technological and financial requirements for local entry into and/or control of assembly activities are significantly greater than those for parts production… Breaking into assembly often mean entering at the top floor. By contrast, local firms can begin the manufacture of auto parts and components requiring less capital and advanced technology.

Thus, the features of the automotive sector may provide an opportunity for smaller firms to engage in production of parts and components in which scale and capability requirements are less stringent. Indeed, this is the rationale for the use of LCRs to overcome market failures that prevent the emergence of competitive suppliers where such is feasible; as WTO/UNCTAD (2002: 20) notes, the automotive sector "uses a relatively large proportion of low technology components, offering the possibility even at an early stage of industrial development of extending the import substitution process backwards from finished products into various linkage activities geared towards the supply of components". Of course, as discussed extensively in the preceding chapter, mandating a level of local content does not mean that suppliers will achieve efficient levels of production as a result. Ultimately, the effects of LCRs depend upon the location-specific characteristics that influence geographic patterns of production, trade and investment more generally.

As Sturgeon and Lester (2004) observe, the locational determinants of automotive production have changed over time, and have included factors that are technical and economic, and policy, institutional and political factors. The main driver of offshore production, historically speaking, has been the prevalence of significant import barriers (including LCRs) at the national level that have forced firms headquartered in the US, Europe and Japan to establish assembly operations, and then later to establish local networks of supply, in each country in which they operate. In more recent years – from the 1980s onwards – the motivation to locate in proximity to dynamic sources of demand has been complemented by intensified pressure to reduce operating costs by locating in lower wage areas (Sturgeon and Florida, 2000: 12). It should also be noted that notwithstanding this motivation to relocate in lower wage countries, large multinational automotive firms operating in multiple location are able to engage in 'divide and rule' strategies vis-à-vis wage bargaining[16].

[16] As discussed in section 2.5.3, it is commonly recognised that the transnational mobility of TNCs confers the latter with advantages in bargaining with governments with respect to taxes, subsidies and regulations, as discussed by Dicken (2003). Coffey and Tomlinson (2006) describe an analogous situation in which TNCs maintain advantages vis-à-vis labour, applying downward pressures on wages through the maintenance of multiple alternative locations of production. As with the strategic behaviour described in relation to the advantages conferred by transnationality, the threat of relocation thus mitigates against union activity and wage bargaining.

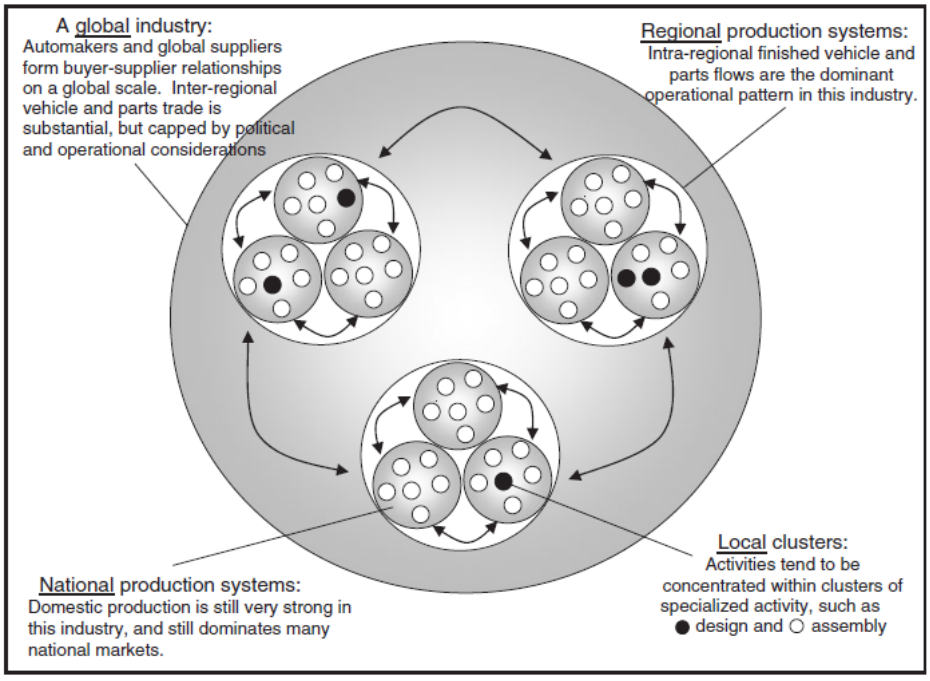
In summary, trends towards global liberalisation coupled with regional integration have led to the idiosyncratic 'nested' structure of the automotive sector, and the emergence of governance structures with strongly regional characteristics, alongside global-scale, national and local elements as well (Sturgeon et al., 2009: 7), as depicted in figure 3-1, below. The next sections provide an overview of the main factors driving the geographic expansion of the automotive sector and determining location-specific industrial performance outcomes, with a particular focus on trade policy and the role of LCRs.

3.4 HISTORICAL OVERVIEW OF THE EMERGENCE OF THE GLOBAL AUTOMOTIVE VALUE CHAIN

3.4.1 The emergence of the 'triad' of leading automotive producing regions

The global automotive sector is dominated by multinational firms originating in North America, Western Europe, and East Asia (Japan and Korea). Independent local firms and joint ventures are also present in emerging markets, but with some partial exceptions, their activities are largely confined to serving domestic markets. Because of the huge economies of scale and technological capability requirements present in the sector, value chain governance must be understood in the context of the advantages and strategies of the most powerful lead firms as they have sought to penetrate foreign markets, constrained by national and regional automotive policies.

Figure 3-1: The 'nested' structure of the automotive value chain.



Source: Sturgeon et al., 2009.

In the initial stages of the industry, vehicles were expensive, custom-made and produced in small volumes. Production was most efficiently located near sources of demand and, on the supply side, firms required technically-skilled labour and specialised inputs; these conditions only existed in the US and Europe (Sturgeon and Florida, 2000: 21). The automotive sector was characterised by a large number of firms producing small volumes of vehicles. The development of mass production techniques, originally in the US, enabled car manufacturers to separate components production and assembly into a number of repetitive tasks, increase productivity, and produce far greater volumes of vehicles (Maxton and Wormald, 1998: 68). This consolidated market power in

the hands of a small number of firms due to economies of scale. As a result, the number of US firms declined from 88 in 1921 to 12 in 1941; by 1930 Ford, General Motors and Chrysler accounted for 90% of US production (Jenkins, 1987: 13). These conglomerates engaged in vertical integration of the entire value chain, from design, through all aspects of production, to sales and marketing. In the governance structure that emerged, "design control rested primarily with the vehicle manufacturer, who contracted for supply on an arms-length, competitive basis", while maintaining the most valuable and sophisticated parts and components production in-house via the establishment of supply subsidiaries and acquisitions of independent parts and components firms (Maxton and Wormald, 1998: 96).

The competitive advantage of the major US firms was viewed as a threat to European producers, leading to heavily protectionist trade policies that drastically reduced imports. This period also saw the first stages of international expansion of capital through FDI, which still characterises the automotive sector to this day: significant trade barriers coupled with high transport costs have ensured that local production by subsidiaries, rather than exports of vehicles, has been the most prevalent mode of market penetration. Ford and General Motors began to undertake significant investments, especially in Europe and Canada, which were the most significant markets outside of the US at that time, but they also established assembly plants in Latin America, South Africa, India, Malalysia, Australia and Japan ((Sturgeon and Florida, 2000: 24-25). In the pre-war period, it has been estimated that 80% of global production was either located in the US or pertained to US subsidiaries abroad (Jenkins, 1987: 16).

The two American giants were the only automakers with significant foreign presence until after World War II, but in the coming years, European companies (in Britain, France, Germany and Italy) started to emulate the mass production techniques that were pioneered in the US, leading to a similar pattern of firm consolidation and the division of parts and components production between in-house and external suppliers. As mentioned in footnote 14 above, the smaller scale of the European producers led to a more horizontal form of governance in which suppliers attained greater economies of scale by serving multiple OEMs. At this stage, the main European markets sought to promote their own national champion firms – e.g. Morris, Renault, Volkswagen and Fiat respectively in Britain, France, Germany and Italy – as well as being host to US subsidiaries and joint ventures. From the late 1950s onwards, in line with the post-war economic resurgence, a number of larger European firms began to export and invest abroad, both in other European countries and in the Americas (Sturgeon and Florida, 2000: 31-32). US firms continued to penetrate the European market through capital expansion and local production, while the segregated nature of the European markets was diminished by the establishment of free trade in vehicles within the EEC; both trends lead to an intensification of pressures which granted competitive advantages to larger manufacturers and resulted in further concentration of market structures.

The success of the European automakers was closely followed by that of Japan. Like in Europe, the growth of Japanese automakers was facilitated by high levels of trade protection[17]. Unlike in Europe, the Japanese automotive sector emerged in the 1960s almost entirely independent of foreign capital. The simultaneous growth of domestic demand, indigenous technological capability development, and the consolidation of firms under the direction of the interventionist Ministry of International Trade and Industry, allowed Japanese conglomerates to rapidly increase

[17] Doner et al. (2006a: 13) write that "the common assertion that government policy had little effect on the development of the automobile industry… is flatly wrong… (It was) indispensable for the industry to build the economies of scale necessary to compete internationally".

production and exports. “Motor vehicle production in Japan soared from a negligible 300,000 units in 1960 to nearly eleven million units in 1982, growing both on the strength of Japan’s largely protected domestic market of about five million units and exports of about six million units” (Sturgeon and Florida, 2000: 35), making Japanese firms an exception to the rule that automakers largely sought to penetrate foreign markets through FDI. Indeed, so successful were the Japanese exporters that the US and Europe imposed discriminatory quotas and ‘voluntary’ export restraints, pushing Japanese firms to increase levels of outward FDI from the 1980s onwards. Japanese productive techniques and supply chain management strategies have also had a profound impact on the nature of the global automotive sector.

3.4.2 The emergence of automotive production outside the triad

In the mid-twentieth century, there began a period of intense competition as US and European automotive firms began to pursue truly global strategies[18], followed by the Japanese in the 1970s and ‘80s. The dominance of the triad established during this period continues to structure the industry today, with only Korean firms emerging as a significant global threat[19].

Although the strategies of the established triad producers were predominantly focused within their own domestic or regional markets[20], they also sought to expand into the other regional centres as well as capture shares of small but highly promising emerging markets, as determined by factors such as income levels, population, and the quality and coverage of road networks. As mentioned previously, by the 1960s American and European firms had already established subsidiaries a number of emerging markets, chiefly in Latin American. Other developing regions either had negligible domestic industries or imported all of their consumption: the ASEAN region did not attempt to develop indigenous automotive manufacturing capabilities until the 1960s (Doner, 1991: 33); the automotive sector in the former Soviet Union was subject to the dictates of a centrally planned economy, with very low levels of private vehicle ownership; and the Chinese, Indian, African and Middle Eastern economies were still characterised by extremely low per capita income levels. Over the coming years, automotive production continued to spread, with the number of countries with assembly plants doubling from 42 in 1960 to 86 in 1976; the total number of assembly plants increased from 170 to 600 during the same period (Jenkins, 1987: 43)[21]. A significant feature of the automotive industrialisation strategies of the ‘latecomers’ was that even though they were relatively insignificant in terms of sales “most automakers were unwilling to forego new investments and cede markets to their competitors” (Sturgeon and Florida, 2000: 32).

Summarising the common features of emerging markets’ automotive industrialisation strategies, Abrenica (1998: 22) observes that they consist

> of several strands: a tariff differential between [finished vehicles and parts] to encourage local assembly; LCRs to support parts manufacturing; restrictions on entry and limitations on model changes to prevent market fragmentation; and export promotion.

[18] As discussed further below, the establishment of the North American and European networks has been strengthened by regional integration in NAFTA and the EU, respectively.

[19] Korean OEMs emerged under highly protected conditions; for analysis of the Korean experience, see Ravenhill, 2001.

[20] This pattern continues, albeit to a lesser extent, today; see UNIDO, 2003 and Sturgeon and Memedovic, 2009 for details.

[21] As Sturgeon and Florida (2000: 34) observe, “during the 1960s and 1970s a regional pattern emerged with most new assembly plants established by American and European automakers were located in Latin America and most plants by Japanese firms were located in Asia”.

The approach to FDI and ownership was less uniform. In light of the dearth of indigenous technological capabilities, most emerging regions were reliant on foreign capital and technology to a greater or lesser degree. Competition between triad automakers provided some leverage to demand the establishment of joint ventures, especially in the supply sector. Some countries (such as Brazil) permitted wholly foreign-owned subsidiaries and did not seek to restrict FDI, while others (such as India) were more openly hostile, severely restricting foreign equity involvement and attempting to elicit the licensing of technology to local firms instead (Humphrey and Salerno, 2000).

In addition, most countries have pursued a sequenced approach to trade policy (Abrenica, 1998). In the first (assembly) stage, they have applied high levels of protection on finished vehicles. Because of the high rates of protection and captive markets, investments in sub-scale assembly operations were still profitable; OEMs were able to retain activities in which scale and technological capability requirements were most stringent in established locations in their home region, while decentralising assembly and the manufacture of less sophisticated, high weight-to-value parts and components (such as tyres and radiators) to the host economy.

Thus, early investments were mostly 'screwdriver' assembly operations, importing completely knocked down (CKD) or semi-knocked down (SKD) kits in order to reduce shipping costs and, later, to obtain tariff advantages granted to goods destined for local assembly vis-à-vis finished vehicles (Jenkins, 1987: 18). In other words, the use of high tariffs on finished vehicles, coupled with supply and demand conditions in the host countries, led to assembly operations with high import propensity and low levels of domestic value added[22]. There was a perception that the strategic interests of the automakers were limiting technology transfer and the opportunities for integration of local firms into their global networks for strategic reasons. For example, as Moran (1998: chapter 5) notes in relation to Latin America,

> automobile firms initially considered the idea of creating a competitive automotive industry in Mexico and Brazil completely far-fetched (…) Such characterizations persisted as long as sub-scale plants… were the predominant form of production (…) In each country, however, as the size of the domestic market began to be large enough to support plants with full economies of scale, costs and quality… began to rival or surpass home-country alternatives (…) The notable features of this period was in fact a stout resistance that the parent companies… mounted against the host-country desire for exports.

These concerns were accompanied by growing sectoral trade deficits; as Jenkins (1987: 42) observes, "production was almost exclusively intended for the domestic market and the integration of the local subsidiaries into the international operations of the parent companies was purely as a market for imported parts and components". These problems have been the impetus to the second stage of automotive sector development: 'localisation', or the promotion of integrated manufacturing systems beyond vehicle assembly, became the overarching goal. To this end, countries have imposed various investment performance requirements on the automotive

[22] Sturgeon and Florida (2000: 26) claim that even prior to localisation policies, there was an incremental tendency for assemblers to source inputs locally. For example, in the early stages of expansion through FDI, US assemblers "began to source parts and materials locally, both from outside suppliers and through the build-up of internal capabilities… Often portrayed as 'mere' assembly plants with no backward linkages to host economies, and therefore indistinguishable from finished vehicle exports, increased local sourcing over time is the norm. Moreover, CKD assembly provides an initial base of activity that provides opportunities for local players that would not otherwise exist" (Sturgeon and Florida, 2000: 26). Nevertheless, the assembly of knocked down kits led to industrialisation that was unquestionably of a fairly shallow form in many developing country contexts.

assemblers in order to encourage (or stipulate) the use of local content as well as integration into export activities[23]. According to Humphrey et al. (2000), this phase began in the early 1960s in Latin America and India, and in the 1970s in Southeast Asia.

Historically, LCRs have been used extensively in developed and developing countries alike, although they have been more prominent in the latter, as shown in Table 3-1 below[24]. Countries that have used LCRs more or less extensively comprise the majority of automotive producers. However, developed countries have not implemented LCRs in the post-WTO environment, and they appear to have used them more sparingly in relation to individual investment projects (see Kumar, 2005, for the cases of Italy, the UK and the US with respect to Japanese automotive investments).

Table 3-1: List of countries in which LCRs have historically been implemented, by development status

Developing countries	Developed countries
Argentina, Botswana, Brazil, Chile, China, Colombia, Ecuador, Egypt, Hungary, India, Indonesia, Iran, Malaysia, Mexico, Morocco, Nigeria, Pakistan, Philippines, Republic of Korea, Peru, Romania, Russia, South Africa, Taiwan Province of China, Thailand, Turkey, Ukraine, Uruguay, Venezuela, Vietnam, and Yugoslavia	Australia, Canada, Greece, Ireland, Israel, Italy, New Zealand, Portugal, Spain, the UK, and the US

Sources: WTO/UNCTAD (2002) Jenkins (1987: Table 3.3), Subramanian and Low (1995), Kumar (2005) and primary and secondary sources encountered in the course of my own research, as described in section 3.5.4. This list is not exhaustive; it is likely that unlisted countries have also implemented LCRs prior to 1995, at which point data have become more readily available as a result of notification requirements and review mechanisms imposed by the WTO.

As I discussed in general terms in chapter 2, the empirical evidence on the effectiveness of LCRs in the automotive sector is mixed; strong conclusions are limited by a paucity of systematic cross-national research and profound methodological difficulties relating to causal attribution. There are numerous automotive sector case studies, but studies on the parts and components sector at which LCRs are targeted are lacking, perhaps as a result of a lack of fine-grained sectorally-disaggregated data, and comprehensive data on the use of such policies (the present thesis utilises new sources of data to overcome these methodological challenges). Perhaps more importantly, LCRs have been analysed as part of a package of measures, not individually; and there have been no attempts to account for capabilities and advantages as contextual factors confounding their impacts.

Indeed, much of the negative empirical evidence cited in the literature pertains to the 1960s and '70s – an era in which LCRs were usually implemented in the context of prohibitively-high tariffs and/or outright bans on vehicle imports and severe restrictions on foreign investment and ownership – and relates to circumstances in which there were excessively large gaps between the technological capabilities of local and foreign investing firms and in which domestic markets were severely limited in size and medium-term potential for growth, especially in comparison with rapidly growing markets in the industrialised triad economies. As discussed in the previous

[23] Export performance requirements are not analysed here, but they have arguably been another important factor in the determination of the productive location, and performance, of automotive FDI.

[24] Data have been obtained from a review by WTO/UNCTAD (2002) and supplemented by data in Jenkins (1987: Table 3.3), Subramanian and Low (1995), Kumar (2005) and primary and secondary sources encountered in the course of my own research, as described in section 3.5.4. This list is not exhaustive; it is likely that unlisted countries have also implemented LCRs prior to 1995, at which point data have become more readily available as a result of notification requirements and review mechanisms imposed by the WTO.

chapter, these circumstances are not ideally suited to rapid technological upgrading and the establishment of efficient linkages arising from the implementation of LCRs.

3.5 ASSESSMENT OF AUTOMOTIVE TRADE POLICIES

3.5.1 Evidence on the effects of import-substitution

Referring to developing countries generically, Abrenica (1998: 22) pronounces that "there is consensus that the long period of protection created vested interests, but neither a competitive industry nor the promised externalities". As Doner et al. (2006b) observe, in many cases, markets were not large enough to elicit the requisite scale investment to achieve efficient levels of price or quality for individual models. The position of developing countries in lead firms' strategies was such that subsidiaries were often used as an outlet for outdated technology (Sturgeon and Florida, 2000: 33). The strategic interests of lead firms – with large investments in production elsewhere – were served by restricting exports, ensuring that production was geared entirely to the limited domestic market, and clashed with host country objectives (UNCTC, 1991: 40-41). Furthermore,

> competition to control the local market usually resulted in a large number of firms entering the industry with a consequent fragmentation of the market and lower levels of concentration than were found in the larger markets where the industry was well-established… as a result… production runs for individual companies were low and costs correspondingly higher (Jenkins, 1987: 42).

In order to ensure greater scale economies in production, host countries often became more restrictive in permitting entry to foreign automakers (Abrenica, 1998); however, this has had the perverse effect of enhancing the market power of those permitted entry. In both cases, the size of the domestic market has severely restricted the feasibility of efficient automotive production in most developing countries. However, although Doner et al. (2006a) note that with the exceptions of Japan and Korea, "the vast majority of attempts by late-developers to build national auto industries through protection and promotion have failed", the establishment of world-class national champions as the sole criterion for effective trade policy may be setting the bar too high; the pertinent question is what would have happened in the absence of intervention. Looking at the inter-temporal evidence, the years following liberalisation of the most excessive forms of trade and investment protection (in the 1980s and 1990s have seen vast expansions in output, trade, and inward investment. On the face of it, the evidence appears straightforward: in many cases of heavy interventionism, trade performance has been weak, with sectoral trade deficits and limited exports, reflecting underlying technological weaknesses and imperfectly competitive market structures. Liberalisation has been a necessary catalyst for the competitive pressures that drive performance improvements, and emerging markets have become integrated into the networks of MNCs (Humphrey, 2003).

On closer inspection, however, the evidence is not so conclusive. Firstly, automotive liberalisation across the emerging markets has coincided with the rapid expansion of demand in the same, from which it is difficult to isolate the impact on performance. Secondly, liberalisation itself has only been fairly partial; even after dramatic liberalisation of trade and investment policies "governments remained active promoters of the industry through investment incentives, local content requirements, export incentives, duty drawback schemes and tariffs" (ibid.: 121). Thirdly, the opportunities presented by liberalisation for integration into global production networks have

largely been limited to a subset of emerging markets; performance outcomes have been highly uneven.

Furthermore, import-substitution era performance has been highly variable, "consistent with the developmental state approach to looking at industrialisation, with its emphasis on the effectiveness of state intervention in explaining differences in industrial performance" (Jenkins, 1995: 641). While many of the heavily protected emerging markets did not achieve international competitiveness, it must be pointed out that they faced a profoundly difficult competitive and learning environment: "the problem was the creation of national industrial capability in a context of oligopolistic market structures" characterised by 'stickiness' of investment decisions and risk-aversion on the part of investors and in which emerging markets were distinctly subordinate (Veloso, 2001: 154). It is entirely plausible that in the absence of intervention, these countries would have been entirely overlooked as productive locations; an important issue is the extent to which subsequent improvements in industrial performance were facilitated by a period of protection in which automotive production became thoroughly embedded in emerging markets' economies, against the possibility that protection gave rise to 'vicious' processes of technological retardation and rent-seeking behaviour. Although this counterfactual is impossible to observe, it is clearly the case that protection encouraged significant investments in productive capacity, which, as sunk costs, would have shaped future patterns of production and investment in the more liberal environment. Arguably, a combination of heavily protectionist policies, and the exertions of states in bargaining with powerful multinationals through the use of performance requirements have led to the emergence of national automotive production networks with high levels of local content in Latin America (Jenkins, 1987; Bennett and Sharpe, 1990), Southeast Asia (Doner, 1991), India (Kim, 2004; Nag, 2011), and South Africa (Barnes and Kaplinsky, 2000). In this sense, the evidence for the long term effects of protection with high static costs is ultimately ambiguous, under the assumption that large scale automotive production in emerging markets may otherwise never have occurred. Indeed, every significant automotive producer since the early consolidation of the US market has emerged under heavily protected conditions.

3.5.2 Evidence on the impacts of LCRs

Turning from the evidence regarding state intervention more generally to that on LCRs more particularly, the evidence is again ambiguous. The conclusion of Moran's (1998) review is that most commonly, LCRs have exacerbated the inefficiency of local assemblers, deterred the transfer of technology to suppliers, and exacerbated rent-seeking in both subsectors. These findings are mainly based on microeconomic simulations within static frameworks, and have focused on the combined impacts of protective policies, rather than LCRs *per se*. Case studies that have found significantly negative results have been carried out for Australia (Pursell, 2001), India (Krueger, 1975), and Latin America (Munk, 1969). Pursell (2001: 3) concludes that multilateral restriction of LCRs "is a useful external counterweight to the influence of domestic lobbies and populist arguments, which in Australia and elsewhere have made local content schemes politically difficult to oppose, and once established, even more difficult to remove". In a survey of 16 countries, Bale and Walters (1986) found that even fairly modest content requirements generated large price differentials due to subscale production facilities.

In most instances in which LCRs have been examined in developing countries, local technological and innovative capabilities were weak. In such circumstances, LCRs appear to have been set at excessively high levels, given the gaps in price and quality between local and established suppliers. This capability gap, as well as the differences in the size of local firms and foreign OEMs and the presence of a captive terminal market, has enabled OEMs to accrue rents at the expense

of suppliers as well as local consumers (Jenkins, 1987). Lead firms had more established supply networks in their home regions, and were reluctant to engage in technology transfer to local suppliers except to the extent required to fulfil their own price and quality requirements, which were less rigorous as a result of artificial protective rents and lack of domestic competition.

Thus where high degrees of trade protection led to the 'artificial' segmentation of the automotive sector along national lines and distorted competitive pressures, LCRs contributed to this effect. Restrictive FDI policies may also have exacerbated the inefficiency of the parts and components sectors. In general, LCRs were intended to encourage local content through any means: either encouraging MNCs to establish linkages with local firms, to establish local in-house production facilities, or bring their existing suppliers with them to the new markets. However, in some cases (e.g. in India; see Kim, 2004), trade policy was used in conjunction with restrictions on ownership in the supply sector to encourage the participation of domestic capital through licensing arrangements and joint ventures; these restrictions may have further discouraged the utilisation and transfer of the most up-to-date technology. These equity and operating restrictions are not a crucial feature of LCRs, but they nevertheless confound their outcomes.

Turning to evidence of positive effects, Veloso (2001) and Kumar (2005) note that case studies provide numerous examples of countries in which the implementation of LCRs and other performance requirements have contributed to the emergence of competitive local suppliers and joint ventures in countries that are wholly or mostly reliant on foreign capital; these have included Brazil (Shapiro, 1994), Mexico (Bennett and Sharpe, 1990), Taiwan (Gee, 1997), and Thailand (Moran, 1998; Natsuda and Thoburn, 2013). More recently, China and India have provided further evidence of rapid upgrading in the presence of LCRs (see Sutton, 2005). Further details of some of these cases are presented in chapter 6. In terms of firm-level evidence, Humphrey and Salerno (2000) provide the example of the Brazilian firm *Freios Varga,* which was incorporated into VW's production systems, supplied with technology, and eventually developed its own design and engineering capabilities, under stringent LCRs. In addition, LCRs have provided incentives for OEMs to establish in-house parts and components subsidiaries, engage in joint ventures, and more recently, to encourage their existing suppliers to follow them to new markets via direct investments. In Thailand, first-tier Japanese suppliers followed their OEM partners to produce for the domestic and regional market (Natsuda and Thoburn, 2013). These mechanisms do not promote local supply firms *per se,* but they still increase the proportion of local intermediates produced domestically, present opportunities for spillovers to local firms within lower tiers of supply, and thus potentially offer better opportunities for the integration of emerging markets into global production networks. The issues are explored further in the context of the emergence of truly global suppliers and the phenomenon of 'follow-sourcing', as discussed in section 3.6.1 below, and in the case studies in chapter 6.

To conclude, as Veloso (2001: 38) notes in a summary of the evidence,

> virtually all the detailed microeconomic studies describe static scenarios of price distortion and transfer of surplus from consumers to producers, eventually with deadweight losses. Nevertheless, none of these seems to incorporate issues related to external effects and spillovers. Longer-term industry assessments, albeit with no quantitative cost-benefit analysis, seem to indicate that the impact can go either way depending on particular conditions of the investment and local market.

In the circumstances of excessively protective trade and investment regimes, saddling investors with additional restrictions by mandating a level of local content beyond the capabilities of local

suppliers to deliver has undoubtedly contributed to the inefficiency of the sector as a whole. In circumstances in which latent local capabilities were sufficiently strong, in which the competitive environment has encouraged rather than discouraged investment and technological upgrading, and in which the domestic market has provided a basis for the attainment of reasonable levels of scale, LCRs have clearly contributed to the establishment of efficient local supply networks that have subsequently matured and become integrated into export markets.

Even where suppliers failed to achieve international competitiveness, and the higher cost of intermediate goods has imposed a heavy burden on downstream producers and consumers, LCRs may still have been worthwhile in the long run. This may be the case to the extent that they have laid the foundations of local capabilities and logistical networks on which to subsequently build in the context of wider liberalisation and as other conditions for efficient manufacturing improve. In other words, we need to account for their dynamic effects, notwithstanding that LCRs have often been costly in static terms. LCRs have altered the 'arbitrariness' of production, trade and investment patterns in the intermediate sector, with consequences that are impossible to precisely determine. In addition, LCRs may have given rise to technological spillovers and wider benefits to the domestic economy, which are extremely difficult to trace.

3.5.3 Methodological limitations of the existing evidence and implications for analysis

The problem is the lack of a counterfactual; as Rodrik (2007: 14) puts it in his assessment of the evidence for and against industrial policy more generally, neither the positive cases "nor the horror stories settle the case". As a result of these methodological difficulties, it is possible to argue that successful cases were the result of other favourable conditions, and that performance would have been even stronger in the absence of LCRs. At the same time, in the unsuccessful cases, one could argue that poor performance outcomes arose as a result of high levels of protection and incorrectly designed (i.e. overly stringent) LCRs, and that furthermore, in the absence of such policies, local supply networks would not have emerged at all.

From the available evidence, it is very difficult to separate the effects of LCRs *per se* from the myriad of other policies and institutions that have been employed concurrently, from idiosyncratic features of design and implementation, and from market conditions – in relation to the opportunities for the attainment of scale economies, and the presence of domestic capabilities for technological learning and absorption – that vary with each specific local context in which LCRs are embedded. Thus, we cannot "identify the specific effects of individual performance requirements, since the measures are often applied in combination" (WTO/UNCTAD, 2002: 23), with wider restrictions on trade and investment but also, for example, with export performance, technology transfer and R&D requirements. Secondly, we cannot separate the observed outcomes from the wider context in which LCRs were employed. In actuality, the conditions under which automotive production is feasible – in terms of the supply and demand conditions – have only more recently emerged in many developing regions; throughout the 1960s, '70s and '80s, income levels, and thus demand for cars, as well as manufacturing capabilities, were severely limited in many of the countries implementing LCRs; these highly suboptimal conditions are likely to have ensured underwhelming results. In this context, it is interesting to consider the effects of LCRs under more appropriate conditions with respect to the feasibility of automotive sector growth in emerging regions which enhance the likely success of policies aimed at encouraging local content. These conditions have emerged, in the past two of three decades, simultaneously with the imposition of multilateral restrictions on LCRs as well as wider processes of liberalisation, regionalisation, and capability development – giving rise to an opportunity for systematic comparative analysis, provided that the core

determinants of parts and performance outcomes can be adequately operationalised at the country level.

In order to make valid inferences, we need comprehensive cross-national data on

- the implementation and elimination of LCRs;
- intermediate sector performance outcomes; and
- factors that codetermine outcomes – independently and in conjunction with the implementation and elimination of LCRs.

Temporally, in order to compare performance outcome pre- and post-elimination of LCRs, I am concerned with the years following the establishment of the WTO, for two main reasons, relating to practical issues of data availability as well as more substantive concerns. In the case of data availability, prior to members' trade and industrial policies being reviewed through WTO mechanisms, it may be difficult or impossible to attain comprehensive data on the utilisation of LCRs; certainly, this would involve consultation of national archive data which would be difficult to access. These data sources are described below. In terms of the substantive justification for my focus on the post-WTO era, this provides an interesting opportunity to examine compare industrial performance outcomes in the manner of a natural experiment, as I discuss in the following chapter; and the post-WTO period also coincides with the emergence of favourable conditions of supply and demand in emerging markets, such that analysis of this period offers a significant departure from studies analysing LCRs in previous time periods. In addition, most the trade and production data which serve as indicators of industrial performance in the automotive parts and components sector, as well as wider contributory factors such as market size on which my analysis is based, are only in a comprehensive format from around 1995, as discussed in section of chapter.

3.5.4 The implementation and elimination of LCRs in the automotive sector

Comprehensive data on the implementation and elimination of LCRs in the automotive sector are available from 1995 for all WTO members, as a result of the provisions of the TRIMs Agreement. Data are available from four main sources: members' notifications of their use of restricted TRIMs, requests for extensions to the phase-out period for restricted TRIMs, dispute cases involving prohibited TRIMs, and accession documents for countries joining the WTO subsequent to its establishment in 1995.

3.5.4.1 Notifications of restricted TRIMs

The primary sources of data on the implementation of LCRs are notifications submitted by each country as part of the requirements of the TRIMs Agreement. Notifications were required to be submitted within 90 days of the establishment of the WTO in January 1995. However, a number of countries made delayed notifications, for various reasons (e.g. Chile had originally notified the relevant measures as a subsidy under separate notification procedures). Accordingly, I have collated TRIMs notified and detailed in the TRIMs committee Annual Report dated November 1996 (WTO document G/L/133).

I examined these notifications individually to determine whether they pertained to the automotive sector. These notifications are shown in table 3-2, below.

On examination of the TRIMs at hand, I discovered that a number were discontinued shortly after the notification (South Africa), some were based on regional rather than domestic content (namely, the Andean Pact countries: Colombia, Ecuador and Venezuela), and some were not LCRs (Uruguay).

3.5.4.2 Extension requests

The second source of data on LCRs is provided by extension requests. Although there was a standard 5 year phase-in period (7 years for least-developed countries), many developing countries took advantage of provisions to request more time to eliminate their TRIMs.

Article 5 of the TRIMs Agreement states that extensions may be granted to the transition period for developing countries which "demonstrate particular difficulties in implementing the provisions of this Agreement". Initial requests, made before the end of 1999, were granted a standard addition two year extension until the end of 2001; the council of trade in goods permitted countries granted such extensions to make an additional two year extension request.

See table 3-3, below, for details of extension requests submitted pertaining to the use of LCRs in the automotive sector. Colombia and Thailand also applied for extensions to the phase out period, but these were unrelated to their automotive sector policies; see WTO documents G/C/W/169 for Colombia and G/C/W/169 for Thailand.

3.5.4.3 Dispute cases

The third important source of data on TRIMs comes from cases that have been brought to the WTO's dispute settlement body. There are a number of countries that did not notify TRIMs but who were taken to dispute panels and found to be using prohibited TRIMs, including LCRs; Brazil, Indonesia and India are in this category. In addition, China was involved in a TRIMs automotive dispute in 2006; although LCRs were withdrawn in 2000, China was found to have reintroduced a number of prohibited measures relating to the redefinition of 'knocked down' kits as finished vehicles[25].

Table 3-2: Notifications of TRIMs relating to the automotive sector

Notifying country	Document code(s)	Nature of TRIM
Argentina	G/TRIMS/N/1/ARG/1	Local content; trade balancing
Chile	G/TRIMS/N/1/CHL/1; G/TRIMS/N/1/CHL/1/Add.1	Local content; export
Colombia[26]	G/TRIMS/N/1/COL/1	Local / regional content
Ecuador[27]	G/TRIMS/N/1/ECU/1	Local / regional content

[25] According to China's 2006 Trade Policy Review (WT/TPR/S/161: p. 202), preferential tariff rates granted on the basis of local content ratios were phased out by 2000. As mentioned above, a dispute panel ruled in 2006 that China had implemented a number of TRIMs-inconsistent policies in 2004-5. Thus, China continued to implement prohibited policies for some time after the formal elimination of LCRs. They were forced to remove these following dispute proceedings (DS339, DS340, and DS342) and did so in August 2009 (China TPR, 2012: 119). The measures in question aimed to reclassify parts (namely, 'knocked-down' kits) as complete vehicles for the purposes of customs tariffs, if they have the "essential character of a motor vehicle". Although these measures have much the same rationale as the policies examined in this thesis, due to their narrower focus on knocked-down kits specifically, and because they do not limit parts imports quantitatively but rather subject them to higher tariffs (i.e. the rate attached to finished vehicles) I have decided to consider that the elimination of LCRs by 2001, prior to China's accession to the WTO, is the more pertinent policy shift, and so I have not included this data in the construction of the main dummy variable. Nevertheless, policies such as these clearly contribute to the climate of protection and promotion maintained by the Chinese government in various ways, as I discuss in the comparative case study of China and India in chapter 6.

[26] The original local content provisions were subsumed by regional content policies in the context of the Andean Pact as of 1995, and as such the measures are separate from LCRs as defined in this study. As the Columbian notification reports, the "policy was made more flexible in the regional context of the Andean Pact, which requires that assembling enterprises include a minimum content of materials produced in the signatory countries to the Agreement, rather than of domestic production".

Indonesia[28]	G/TRIMS/N/1/IDN/1; G/TRIMS/N/1/IDN/1/Add.1	Local content
Mexico	G/TRIMS/N/1/MEX/1; G/TRIMS/N/1/MEX/1/Rev.1	Local content; trade balancing.
Malaysia	G/TRIMS/N/1/MYS/1; G/TRIMS/N/1/MYS/1/Rev.1	Local content
Pakistan	G/TRIMS/N/1/PAK/1	Local content
Philippines	G/TRIMS/N/1/PHL/1	Local content; foreign exchange balancing
Romania	G/TRIMS/N/1/ROM/1	Local content
South Africa[29]	G/TRIMS/N/1/ZAF/1	Local content
Thailand	G/TRIMS/N/1/THA/1	Local content
Uruguay	G/TRIMS/N/1/URY/1	Export
Venezuela[30]	G/TRIMS/N/1/VEN/1	Local / regional content

Source: WTO, document codes as detailed above.

Table 3-3: Automotive TRIMs extension requests

Country	Document code(s)
Argentina	G/C/W/176; G/L/460; G/L/497
Malaysia	G/C/W/174; G/L/462; G/L/499
Mexico	G/C/W/171; G/L/463; G/L/500
Pakistan	G/C/W/173; G/L/466; G/L/501
Philippines	G/L/325; G/L/464; G/L/502
Romania	G/C/W/175; G/C/W/290; G/L/465

Source: WTO, document codes as detailed above.

3.5.4.4 Accession protocols

Another source of data used to construct the TRIMs policy dummy is provided by WTO accession protocols. A number of countries were not WTO Members at the time of the establishment of the organisation. On accession, countries had to sign a protocol establishing the nature of their commitments arising from WTO membership[31]. These documents specify what types of WTO-inconsistent TRIMs were in force prior to accession, and when they would be eliminated. Countries were also required to address existing Members' questions regarding any concerns that prohibited were in force, and commit to remove them in a specified timescale. I have consulted these accession protocols and have identified that prohibited TRIMs (more specifically LCRs) were in force in the following countries prior to their accession: China, Chinese Taipei (Taiwan), Russia[32], the Ukraine, and Vietnam.

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[27] As footnote 26, above.

[28] Indonesia subsequently withdrew the portion of the notification pertaining to the automotive sector, but the measures were brought to the dispute settlement body, as described below.

[29] These measures were withdrawn later in the same year.

[30] As footnote 26, above.

[31] The text of each protocol is available is available at https://www.wto.org/english/thewto_e/acc_e/completeacc_e.htm, accessed 25/1/15.

[32] Russia implemented local content rules in 2005, acceded to the WTO in 2012, had not eliminated LCRs at the time of writing, and is therefore not covered by the data I analyse in the present study. The working party report on Russia's accession (WT/ACC/RUS/70 WT/MIN(11)/2) states that LCRs were implemented in 2005 and are due to run until 2018 (pp. 275-9).

3.5.4.5 Consolidated data on the implementation and elimination of automotive LCRs in the post-WTO era

Consolidating data from this range of qualitative sources, I have identified 17 countries which have implemented LCRs since the establishment of the WTO and the years in which the policies were last in force: these data are presented in table 3-4. Sources are detailed in appendix 2.

Table 3-4: Countries that eliminated TRIMs-prohibited policies in the automotive sector, post-1995, with start and end dates

Country	Start date of LCRs, where specified in notifications and/or secondary literature[33]	Finish date (last year LCRs still in force)	Type of TRIM(s) in force	Nature of LCR (i.e. mandatory requirement or fiscal incentive[34]), where specified
Argentina	1979	2003	Local content; trade balancing	Fiscal incentive: tariff reductions
Brazil	1995	1999	Local content; trade balancing; export	Fiscal incentive: tariff reductions
Chile	1985	1998	Local content; export	Fiscal incentives: tariff reductions and tax credits
China	1994	2000	Local content	Mandatory requirement
India	1992	2002	Local content; trade balancing; export	Mandatory requirements for granting of import license
Indonesia	1993	2000	'Deletion lists'; local content	Fiscal incentives: exemption from tax and tariff reductions
Malaysia	1991	2003	Local content	Discretionary investment incentives: recipients of Pioneer Status or Investment Tax Allowance subject to LCRs
Mexico	1990	2003	Local value added; trade balancing	Mandatory requirement
Pakistan	1987	2006	'Deletion lists'; local content; trade balancing; exchange balancing	Fiscal incentives: tariff reductions
Philippines	1987	2004	Local content; foreign exchange balancing	Attached to incentives associated with various 'development programs'
Romania	1994	2002	Local content; export	Mandatory requirement for specified investments, but attached to fiscal incentives
South Africa	1989	1995	Local content	-
Taiwan	1979	2001	Local content	Mandatory
Thailand	1975	2000	Local content	Fiscal incentives
Ukraine	1997	2001	Local content	Fiscal incentives: exemption from tax and tariff reductions
Vietnam	1987	2006	Local content; export	-

[33] LCRs implemented under different legislation may have been in force prior to this date; the dates provided here are the first years in which LCRs were definitely in force, as verified by the author in consultation with the data described above.

[34] This distinction is not always clear cut, even if countries provide accurate information; this is because the measures may not be mandatory in the technical sense, but may be taken into consideration in the determination of discretionary decisions (for example with respect to licensing) and are therefore 'de facto' mandatory for a firm to be able to operate.

The 16 countries that are relevant to an empirical examination of the elimination of LCRs in the automotive sector in the post-WTO period, therefore, are: Argentina, Brazil, Chile, China, India, Indonesia, Malaysia, Mexico, Pakistan, the Philippines, Romania, South Africa, Taiwan, Thailand, Ukraine, and Vietnam.

3.6 FACTORS DRIVING THE ECONOMIC GEOGRAPHY OF PRODUCTION, TRADE AND INVESTMENT IN THE AUTOMOTIVE SECTOR

3.6.1 Recent developments in value chain governance

We now turn to an examination of the context in which the elimination of LCRs has occurred. The competitive environment has changed profoundly in recent years, with huge implications for the opportunities of suppliers in emerging markets to enter the production systems of the triad OEMs. These changes have related to factors internal to governance structures and the capabilities and advantages in different locations, all of which are interdependent. This "morass of influences, tendencies and causes that structure empirical outcomes" results in a "rich and roiling stew of causation and outcome" (Sturgeon et al., 2008) from which the impacts of LCRs must be isolated.

3.6.1.1 Competitive pressure and consolidation in the automotive value chain

At the level of value chain governance, Japanese success, which emerged as a result of revolutionary 'lean manufacturing' techniques pioneered by Toyota (Womack et al., 1990) has had far-reaching implications for the global competitive environment[35]. Faced with a threat to their established markets, OEMs in these regions have intensified efforts to expand to new markets; thus, "Japanese vehicle manufacturers have triggered the shift from national and regional… to global oligopoly" and contributed to circumstances of "gross over-supply" (Maxton and Wormald, 1998: 143).

Additional pressures have emerged in light of increasingly complex technologies and diversity of consumer demand. OEMs have had to create a wider range of products, with increasingly stringent environmental and safety features, while at the same time lowering costs simply to be able to maintain market shares.

Together, these factors driven two major phenomena: firstly, consolidation in both the assembly and parts subsectors, as firms seek to capitalise from greater economies of scale and scope, and relatedly, more effective exploitation of common 'platforms' and designs, to which variations are made according to consumer preferences in specific locations. Secondly, automakers have responded to technological and competitive pressures as well as opportunities to capture value in non-manufacturing activities and by outsourcing a larger proportion of manufacturing activity to suppliers. By concentrating on "design, brand management and customer relationship, assemblers have clearly set a strategic direction toward capturing more of the section of the value chain that links them to the final customer, including dealerships and services" (Veloso and Kumar, 2002: 50).

Mapping ownership patterns and consolidation in the automotive value chain is not a straightforward endeavour because since the initial internationalisation of the sector through foreign investment by the American giants, the sector has been characterised by complex

[35] For example, "in the US, domestic automakers have lost more than 20 percent market share to Japanese and Korean automakers in the past two decades… Europe has experienced a similar trend" (Veloso and Kumar, 2002: 2).

arrangements encompassing joint ventures, state ownership, wholly-owned subsidiaries and different forms of strategic cooperation and equity investment.

Nevertheless, it is clear that there has been a long term and increasing trend towards consolidation in the OEM segment of the value chain, picking up momentum in the 1990s (KPMG, 2010). Besides market factors, consolidation has been driven by changes in the global policy environment: for example, regional integration, especially within Europe, that has eroded the domination of smaller firms within protected domestic home markets; the opening of Eastern European markets to competition after the fall of the Soviet Union (ibid.); and wider processes of global trade and investment liberalisation.

Of the top 50 automakers in 2008, 42 were passenger car manufacturers[36]; taking into account "equitable interest complexities… the number is reduced to 32" (KPMG, 2010: 15). Of these, 13 can be considered truly 'global', while the remaining 19 are still strongly dependent on national markets (ibid.)[37]. The 13 global automakers, as of 2008, were: BMW; Daimler (Mercedes); Fiat-Chrysler; Ford; Fuji (Suburu); GM; Honda; Hyundai; Mitsubishi; PSA (Peugeot-Citroen); Renault-Nissan; Toyota; and VW.

Many of the 13 global conglomerates have consolidated their market power by acquiring struggling brands – BMW with Rover and Rolls-Royce; Ford with Jaguar, Land Rover and Volvo; GM with Daewoo and Saab; Hyundai with Kia; and VW with Audi, Seat and Skoda[38] – while others have been involved in high profile mergers of 'equal partners' (Fiat-Chrysler, Peugeot-Citroen and Renault-Nissan). In addition, a number of firms have substantial equity holdings in or have entered into joint ventures with other OEMs in specific markets. All of them have substantial foreign investments, both as wholly-owned subsidiaries and in various forms of joint ventures with local capital and other automakers.

3.6.1.2 Developments in supply chain governance

In line with the developments described above, the nature of assembler-supplier relationships has changed in several significant ways. As suggested above, assemblers have transferred significant design responsibilities and activities relating to the coordination of subordinate suppliers to competent first-tier suppliers in an effort to reduce costs. In line with their own global platforms, assemblers have also required suppliers to follow them to new markets; a global presence has become a prerequisite for first tier suppliers of the major automakers (Humphrey and Salerno, 2000; Sturgeon and van Bieselbroeck, 2011).

The emulation of Japanese-style supplier relationships is an important driving force behind the global tendency to delegate design and engineering responsibilities to first tier suppliers. Traditionally, Western OEMs would carry out innovative and design activities in house, and provide first tier suppliers with technological specifications for individual parts (Sturgeon, 2001: 15). First tier suppliers would source sub-components from second tier suppliers, who would in turn source raw materials from third and lower tier suppliers (Veloso and Kumar, 2002). It became apparent that Western vehicle manufacturers, simultaneously engaging with in-house parts and

[36] The industry is differentiated in terms of vehicle segment, with firms variously specialising in passenger vehicles, motorcycles, and commercial vehicles such as trucks and buses.

[37] Some of the more successful Chinese and Indian firms have also acquired flailing foreign brands to obtain advanced engineering and design expertise; "emerging market companies are using their financial muscle to make strategic and/or opportunistic cross-border acquisitions" (KPMG, 2009).

[38] Some of these brands have subsequently been discontinued (as in the case of Rover, Daewoo and Saab) or resold, as in the case of Jaguar and Land Rover to Tata Motors by Ford.

components subsidiaries and independent suppliers at 'arms-length', "attempted to relate to too many firms directly", thus making it difficult to "sustain relationships of sufficient density and quality" (Maxton and Wormald, 1998: 97). This pressure has led to various attempts to streamline the supply chain by delegating responsibilities to two types of supplier: modular suppliers[39] which typically specialise in the design and manufacture of entire systems, rather than individual parts; and systems integrators, which oversea and coordinate the activities of subordinate suppliers according to designs specified by the OEM (Veloso and Kumar, 2002; Doran, 2004). In line with this process, the internal components-related activities of the largest Western OEMs have been carved into separate firms which compete for contracts to produce modules for other lead firms (Humphrey and Salerno, 2000: 156).

These factors are leading the global supply sector to a similar pattern of consolidation and concentration as the assembly sector; in fact, they have consolidated the position of global suppliers, who operate at similar scale to the global assemblers and with similar geographic reach to the largest multinational assemblers.

Such developments in supply chain governance have been ongoing for a long period of time, and have substantially altered the distribution of manufacturing value-added between assemblers and suppliers. According to Maxton and Wormald (2004), suppliers' share of value has increased from 25% in 1955 to 75% in 1995, with assemblers accounting for the remaining shares. Suppliers based in emerging markets face genuine opportunities as OEMs seek to "increase local parts production to avoid foreign exchange fluctuations, meet short delivery times, adapt to local demand, and make use of cheaper local inputs" (Doner et al., 2004: 159).

However, the trends also impose steeper entry barriers: additional capability requirements, and the threat of 'follow-sourcing', present a severe challenges to the ranks of small, domestically-oriented firms that have been fostered under the protection of policies such as LCRs; there is a risk of denationalisation and migration of existing production facilities to more advantageous locations. Although they have led to the intermediates sector capturing an increasing proportion of total automotive value-added, the criteria for becoming a first-tier supplier have become vastly more stringent. Only countries which have the requisite location-specific advantages to attract global firms and/or enable upgrading within locally-owned firms are likely to become integrated into global supply networks.

3.6.2 Location-specific advantages in emerging markets

Clearly, the location-specific advantages that countries can "offer to foreign automakers and to first-tier global suppliers vary significantly". As I have posited in my conceptual and theoretical framework, these factors influence the impacts of both the implementation and elimination of LCRs.

Location-specific advantages in the automotive parts and components sector relate to the attractiveness and stability of the business and investment environment, which can be seen as comprising three interrelated elements:

[39] According to Doran (2004: 103), "Perhaps the most tangible representation of the modular approach is the 'Smart' car collaboration… Whilst a typical car is likely to necessitate the coordination of around 100 first tier suppliers, the Smart car collaboration has been engineered and designed using 25 module suppliers. The benefits of this approach are clear: less direct suppliers to deal with, lower costs to the OEM and less risk and less investment (particularly of capital assets). The module supplier benefits in terms of increased responsibility, greater involvement in the development and design process and the possibility of a higher proportion of value creation activity".

- size, rate of growth and growth potential of national and regional markets for motor vehicles;
- local manufacturing and technological capabilities
- policies and institutions relating to trade and investment generally and the automotive sector specifically.

Eyes have turned to emerging markets as the most important sources of growth in demand, following stagnation in mature markets; meanwhile, many of the same markets have witnessed remarkable transformations on the supply side, and are becoming desirable based on efficiency-seeking criteria. At the same time, there have been important policy and institutional developments at global and regional level: increased openness to trade and investment (of which the elimination of LCRs is an example) and the proliferation of regional and bilateral trade and investment agreements. This is not to downplay the continued role of national policies and institutions, which is still substantial. The resulting complexity greatly complicates the evaluation of the elimination of LCRs.

Continued use of high tariffs in the terminal sector coupled with political pressure have given rise to a persistent tendency for producers to 'build where they sell' and establish production facilities in emerging markets. States still legally impose a variety of performance requirements on investments, and continue to shape local content decisions informally and via 'under-the-counter' means (the results of which have occasionally been subject to WTO dispute settlement procedures). Additionally, in the context of regional integration, high common external tariffs, rules of origin and regional content requirements serve as partial substitutes for national protective policies, with similar effects. All of these factors shape industrial performance and the strategic decisions of multinational and domestically-oriented firms. In this regard, it is important to see that emerging markets follow a variety of strategic regional institutional 'configurations', which are related to their national market size and proximity to wider regional markets, among other factors. This complexity greatly complicates the evaluation of the elimination of LCRs.

3.6.2.1 Shift in demand towards emerging regions

Perhaps the most profound shake-up in the automotive sector in the past two to three decades has been the shift in demand from the mature to emerging markets, as shown in table 3-5. The increases in global vehicle sales since 1990 have come predominantly from emerging markets, including those in which LCRs have been utilised in the post-WTO period; indeed, China, India, ASEAN and Mercosur have all recorded impressive average annual growth rates compared to the mature triad markets. In absolute terms, emerging markets accounted for the majority of global vehicles sales by 2013. Of course, there is substantial variation between countries in terms of the size, growth and potential of emerging markets. As Sturgeon and van Bieselbroeck (2011) document, the "industry's growth in the developing world has been limited to a specific subset of countries". The size and potential of the domestic market, as well as geographical proximity and access to wider markets, inform each country's strategic approach to automotive policy, as discussed below.

Table 3-5: Vehicle sales in thousands of units, percentage of world sales (in parentheses), and average annual growth rates: selected years

	1990	1997	2005	2013	Annual growth 1990-97	Annual growth 1997-2005	Annual growth 2005-2013
World	47800	51780	65958	85394	1.2	3.4	3.7
Triad	38246 (80.0)	38476 (74.3)	43049 (65.3)	37134 (43.5)	0.1	1.5	-1.7
Western Europe / EU 15	15597 (32.6)	15294 (29.5)	16942 (25.7)	13181 (15.4)	-0.3	1.3	-2.8
USA and Canada	15464 (32.4)	16922 (32.7)	19074 (28.9)	17664 (20.7)	1.3	1.6	-0.9
Japan	7777 (16.3)	6725 (13.0)	5852 (8.9)	5376 (6.3)	-1.9	-1.6	-1.0
Rest of world	9554 (20.0)	13304 (25.7)	22909 (34.7)	48259 (56.5)	5.6	9.0	13.8
Asia-Oceania (excl. Japan)*	3036 (6.4)	6077 (11.7)	14586 (22.1)	35079 (41.1)	14.3	17.5	17.6
ASEAN	N/A	N/A	1929 (2.9)	3542 (4.1)	N/A	N/A	10.5
China	704 (1.5)	1606 (3.1)	5758 (8.7)	21984 (25.7)	18.3	32.3	35.2
India	357 (0.7)	761 (1.5)	1440 (2.2)	3241 (3.8)	16.2	11.2	15.6
Korea and Taiwan	1437 (3.0)	1995 (3.9)	1617 (2.5)	1802 (2.1)	5.5	-2.4	1.4
Latin America	1201 (2.5)	3270 (6.3)	3069 (4.7)	7340 (8.6)	24.6	-0.8	17.4
MERCOSUR	N/A	N/A	2118 (3.2)	4802 (5.6)	N/A	N/A	15.8
Brazil*	914 (1.9)	2070 (4.0)	1715 (2.6)	3767 (4.4)	18.1	-2.1	15.0
Mexico	550 (1.2)	503 (1.0)	1169 (1.8)	1101 (1.3)	-1.2	16.5	-0.7

Source: author's calculations based on UNIDO (2003: 3) for 1990 and 1997, OICA (2015) for 2005 and 2013.

Enhanced manufacturing capabilities in emerging markets

Following Doner et al. (2006b), capabilities that affect the development of automotive sector are comprised of a combination of "skilled and flexible workers, and high levels of engineering talent", capital availability, and "high quality infrastructure, especially ports, highways, and telecommunications, speedy customs clearance, and streamlined regulatory approvals". Furthermore, the "auto industry is still fairly labor intensive, so wage levels are significant".

In this context, it is clear to see that many of the most important emerging markets are attractive locations not only based on their large, rapidly growing markets but also as a result of "a huge surplus of low-cost but skilled labour … Countries like Brazil, China and India have attracted large FDI flows to supply local markets *and to export back to developed countries*" (Sturgeon et al., 2009: 9; my emphasis). As UNIDO (2011a: table 8.1) demonstrates, developing countries have captured an increasing share of world manufacturing value added over the past 25 years, their share rising from 21% in 1990 to 36% in 2010; the trend is even more pronounced with respect to manufactured exports (ibid.: chapter 9). Within this overall picture however, "there are sharp variations in manufacturing performance among developing economies and regions" (ibid.: 142), with the East Asia region, and especially China, accounting for the lion's share of developing countries' increased share of global MVA and manufactured exports.

3.6.2.2 Policies and institutions affecting automotive sector development in emerging markets

Most of the protected emerging markets had considerable trade deficits in their automotive sectors in the early 1990s. States became acutely aware that strong forms of import substitution and nationalist industrial policies had failed to result in mature and competitive automotive

sectors (although, as I have just described, the role of individual policies is hard to determine, and both high levels of trade protection for finished vehicles and LCRs appear to have had mixed results). On the whole, the emerging market economies have responded in two ways. Firstly, they have reduced extremely high tariff levels and eliminated severe restrictions on the activities of foreign firms. Secondly, and relatedly, a number of emerging economies have moved further towards regional integration. However, these overall trends mask a considerable degree of heterogeneity across emerging markets, including those which I have identified as having eliminated LCRs in the post-WTO era.

Trade policy

It is widely known that globally, levels of protection have fallen rapidly since the early 1990s, both for finished vehicles and for parts, as shown in tables 3-6 and 3-7, below. As well as a reduction in tariffs, an equally significant development has been the phasing out of import quotas under the auspices of the WTO. Thus, the focus on tariff levels masks reductions in protection afforded by quotas and import restrictions.

Table 3-6: Applied tariffs, %, simple average, vehicles (ISIC 341)

	Early 1990s (1990 unless otherwise specified)	**Mid 1990s** (1995 unless otherwise specified)	**Early 2000s** (2000 unless otherwise specified)	**2005**
All countries	22	17	14	13
All high-income	9	4	4	3
Low and middle income	41	22	18	16
ASEAN	37	23	28	20
China	82 (1992 data)	48 (1996 data)	45	20
EU	21	2	9	8
India	132	37 (1997 data)	72 (2001 data)	51
Mercosur	63	17	19	18
NAFTA	2	7	7	7

Source: WITS (2015).

Table 3-7: Applied tariffs, simple average, parts and components (ISIC 343)

	Early 1990s (1990 unless otherwise specified)	**Mid 1990s** (1995 unless otherwise specified)	**Early 2000s** (2000 unless otherwise specified)	**2005**
All countries	17	13	11	9
All high-income	3	2	3	3
Low and middle income	31	17	15	11
ASEAN	37	24	18	13
China	53 (1992 data)	29 (1996 data)	26	11
EU	5	5	3	5
India	44	36 (1997 data)	35 (2001 data)	15
Mercosur	35	15	16	13
NAFTA	1	5	5	4

Source: WITS (2015).

Some additional observations are pertinent here. Firstly, on average, tariffs for finished vehicles are substantially higher than for parts and components. As a result, it should be recognised that nominal tariff rates, as discussed here, significantly understate effective rates of protection for

the assembly sector[40]. Notwithstanding the significance of effective protection as the most appropriate measure of protection of the final goods (vehicle) sector, nominal tariff rates are adequate for descriptive and comparative purposes considering that we are not substantively concerned with rates of protection prevailing in the assembly sector *per se* in this thesis, but rather the elimination of a specific form of non-tariff barrier pertaining to the parts and components sector.

Secondly, for both product groups, substantial levels of protection persist, on average, in low and middle income countries as a group. At the same time, these countries have experienced more significant absolute reductions in tariff levels. Thirdly, tariffs have not been reduced consistently across time. Indeed, in some regions, tariff data show an initial increase in rates in the years leading up to and immediately following the establishment of the WTO which can be partly explained as a consequence of the 'tariffication' of import regimes, as well as the intensification

[40] Measuring the protective effects of tariffs and non-tariff barriers is not straightforward. There are several main reasons for this. Firstly, different forms of protection need to be transformed into one uniform, comparable measure (i.e. 'tariff equivalent'). In principle, this is a straightforward endeavour, in which the tariff equivalent of a non-tariff barrier is defined as the percentage difference between the world price and the domestic price of the restricted import. In practice, the measurement of tariff equivalents is confounded by stringent data requirements on the price effects of different forms of intervention, and valid comparison between tariffs and tariff equivalents is conceptually problematic, as documented by Krugman (1993: 140). However, as Krugman (ibid.) notes, "despite these problems, the measurement of protection is a useful exercise, giving at least a rough idea of the quantitative importance" of different forms of trade policy.

An even more profound difficulty is that 'nominal' tariff rates and tariff equivalents may be misleading with respect to the amount of protection conferred on different stages of fragmented production processes. Protection on value-added at different stages of fragmented manufacturing processes "will depend not only on any interventions which affect the price of the final good produced, but also by any interventions which affect the price paid for inputs into the production process" (Greenaway and Milner, 1993: 78). In other words, nominal protection is measured as the effect of the policy measure on the price of gross output, whereas effective protection is calculated as the price effect of the policy measure on domestic value added. Thus, in contrast to nominal protection, effective protection more accurately reflects the extent to which protective measures allow domestic costs within different industrial activities to exceed world costs.

The essential insight of the theory of effective protection is that, in industries in which intermediate inputs contribute a large proportion of the value-added embodied in the final product, nominal and effective rates of protection can diverge significantly; relatively low nominal tariff rates on final goods provide effective rates of protection many degrees of magnitude higher on assembly activities. This phenomenon is particularly acute in the automotive sector, in which the structure of protection usually follows a pattern of tariff escalation, with higher nominal tariff rates for complete vehicles than for parts and components used in their assembly.

To understand the implications of the theory of effective protection, consider Krugman's (1993: 141) hypothetical (but plausible) example. A vehicle costs $10000 at world prices, of which $8000 represents the value of manufacturing intermediate inputs, and $2000 represents the value of assembly tasks. In a potential importing country, the cost of assembling the same vehicle from imported parts is $4000. By imposing a 20% tariff on the imported vehicles but permitting duty free imports of parts, the price of imported vehicles rises to $12000, which permits the assembler to compete with imports despite costs that are twice those of foreign assembler; the effective rate of protection on value added in the assembly sector is thus 100%.

The same example can be used to demonstrate that rates of protection on the inputs used to produce a good enter into the determination of effective protection rates. Again, following Krugman (ibid.), "a 5 percent tariff on imported automobile parts, other things being equal, would reduce the margin on which domestic assemblers can work from $2000 to $1600, that is, it would amount to a negative 20 percent rate of effective protection". This obviously applies to the tariff equivalent of measures such as LCRs as well as tariffs on intermediate goods: "overall, assessing effective protection thus requires measuring tariff equivalents not only on an industry's outputs but also on all its inputs" (ibid.).

of efforts to promote domestic production, as discussed below. It may also be the case that low tariffs mask considerable protection through non-tariff barriers, for example discretionary import licensing procedures and quantitative import restrictions imposed for balance of payments purposes.

Investment restrictions

As Dunning (1998) discusses, the characterisation of state-MNC relations in the developing world has gradually shifted from "uneasy, if not downright hostile" to "non-adversarial and cooperative" over the course of the past few decades. Although it is difficult to quantify this shift due to the nature of investment policies, it is suggested by the ratio of inward FDI to GDP, which has increased dramatically in the past three decades in both high- and low and middle-income countries, as shown in table 3-8, below.

Table 3-8: Ratio of inward FDI to GDP, by income grouping: selected years

	High income	Low & middle income
1985	0.48	0.55
1995	1.01	1.96
2005	2.45	2.86

Source: World Bank (2011).

In addition, the OECD *FDI Regulatory Restrictiveness Index* quantifies equity restrictions and discretionary FDI screening mechanisms in individual sectors, but data are only available for a limited number of non-OECD countries; simple group-level averages of index values, as well as individual country data for Argentina, Brazil, China, India, Indonesia and Malaysia – all of the countries which have implemented LCRs in the post-WTO period and for which data are available, are provided in table 3-9, below.

Table 3-9: OECD investment restrictiveness index, transport equipment sector: selected economies and years

	1997	2003	2006	2010
OECD average	0.036	0.026	0.020	0.020
Non-OECD average (countries for which data are available)	0.211	0.121	0.091	0.061
China (People's Republic of)	0.625	0.575	0.485	0.410
India	0.350	0.080	0.000	0.000
Indonesia	0.262	0.070	0.070	0.060
Malaysia	0.360	0.100	0.100	0.000

Source: OECD (2015).

The data illustrate that with respect to equity restrictions in the transport equipment sector, policies discriminating against foreign investment have declined, but are still more prevalent in non-OECD countries compared to the OECD. There is a large amount of variation between countries, with Argentina and Brazil operating relatively open FDI regimes, while significant restrictions remain in China and Indonesia.

Diversity of regional institutional configurations in emerging markets

These trends suggest that while on average, countries accepted that their approaches had often discouraged investment and raised the costs of production excessively – especially in the context of small domestic markets – they wanted to continue to encourage assembly as well as more holistic integrated supply networks, rather than rely on market forces which had led, in the past, to import-intensive 'enclaves'. As such, liberalisation has been cautious and partial: the

perception was that continued intervention – of a more 'liberal', subtle and pragmatic variety – was warranted, as reflected in states' response to the TRIMs agreement. As Humphrey et al. (2000: 42) observe:

> Automotive industry trade regimes were significantly more open by the end of the 1990s. However, this in no way signified that governments in emerging markets had left the future of the motor industry in their countries to the play of market forces… governments still actively sought to promote domestic vehicle production with a significant degree of local content.

One example of this is the fact that, at the time of the establishment of the WTO in 1995, all of the most important emerging automotive markets continued to implement LCRs.

Although the emerging markets exhibit some common trends, they are by no means a homogenous group. As Humphrey et al. (2000: 6) suggest, in terms of policies and institutions driving the economic geography of production, trade and investment with respect to emerging markets, outcomes are defined by the interplay of three tendencies:

1. Continuing protection of domestic markets.
2. Increased liberalisation of automotive trade within regions, but possibly combined with continuing, or even increasing, barriers to inter-regional trade.
3. Increased liberalisation of trade in vehicles and components between countries and regions in a global economy.

The elimination of LCRs is an important example of tendency '3', as defined above, that has occurred as a result of the exogenous restriction of the TRIMs Agreement. In the content of confounding policy and institutional factors, we are concerned with isolating the impacts arising from this specific form of global liberalisation.

As documented in Humphrey et al. (2000) and Carrillo et al. (eds.) (2004), regional integration has had a profound influence in the development of the automotive industry. Indeed, vehicle manufacturers have been among the most important groups lobbying for regional integration. As noted by Sturgeon and Van Biesebroeck (2011: 183), "regional organisation of vehicle production stands in stark contrast to other important high-volume, consumer-oriented manufacturing industries, especially apparel and electronics, which have developed global-scale patterns of integration that concentrate production for world markets in fewer locations".

Regional trade agreements such as the EU, NAFTA, MERCOSUR and ASEAN have enabled regional production networks to flourish, exploiting greater economies of scale and more extensive divisions of labour within larger protected markets[41]. As suggested above, regionalisation involves the free(r) movement of intra-regional trade, but features such as common external tariffs, 'rules of origin' and regional content policies provide protection from extra-regional imports. These agreements may be divided analytically into 'core' and 'emerging' regions. The EU and NAFTA are centred on vast, mature automotive markets in Western Europe and the United States respectively, and also comprise 'peripheral' countries which offer low-cost locations for assemblers producing for the regional market. In contrast, ASEAN and Mercosur are entirely comprised of developing countries of roughly equal income levels.

However, not all countries have followed the regional route; and among those that have, the forms and implications of regional institutions have varied massively. Humphrey et al. (2000) identify three 'configurations' or combinations of the above tendencies empirically, which they

[41] Other agreements exist but have not led to nearly the same degree of intra-regional liberalisation in the automotive sector, and are thus disregarded from this discussion. See Carrillo et al., 2004.

define as Protected Autonomous Markets (PAMs), Emerging Regional Markets (ERMs), and Integrated Peripheral Markets (IPMs). The PAM strategy is most apparent in the cases of very large continental-sized markets, China and India. Other opportunities still remain for smaller countries, to the extent that they can position themselves competitively within a regional 'automotive space'. The IPM strategy involves serving as low cost hubs for producers in the three "mega regions – East Asia, North America and Europe" (ibid.) as in the case of Eastern European countries and Turkey integrating into EU networks, and Mexico in the case of NAFTA. Within ERMs, members strive to achieve dominant positions as regional hubs of production and trade, as previously nationally-based production systems are reoriented in the face of fragmentation and agglomeration within the larger market.

In summary, the developments discussed in the context of the context of the preceding section comprise the complex determinants of automotive sector outcomes that must be considered in my research design and method, as I seek to isolate and examine the impacts of the elimination of LCRs among other factors. These concerns are the subject of the next chapter.

4 A MIXED METHOD APPROACH TO EVALUATING THE IMPACTS OF THE ELIMINATION OF LCRS IN THE AUTOMOTIVE SECTOR

4.1 CHAPTER OUTLINE

In the previous chapter, I positioned the implementation and elimination of LCRs in the historical context of the global automotive sector, and identified the pertinent location-specific factors that influence the economic geography of production, trade and investment in the intermediate parts and components sector. Having determined whether TRIMs have necessitated the elimination of LCRs in specific countries' automotive sectors, this opens up the possibility of empirical comparison of impacts in (at least) two ways: across time, i.e. before and after the imposed policy change; and across countries, i.e. those on which the restriction has imposed a policy change and those for which policy change was not required. A third source of comparison, again of theoretical interest, arises from the comparison of the experiences of structurally diverse countries and regions (with respect to the aforementioned locational advantages), within the group of countries subject to the exogenous restriction.

Turning now to my selection of concrete methods, I review the strengths and weaknesses of case- and variable-oriented methods as they pertain to different aspects of my research problem and different forms of comparison. In doing so, I establish a strong case for conducting mixed methods research, incorporating 'difference-in-difference' panel regression and comparative case studies. This mixed, 'nested' approach entails progression from a simple, additive linear model aimed at identifying and quantifying the 'global' impacts of the policy restriction, to a more expansive treatment of the complex factors that determine case-specific outcomes, and the mechanisms through which they operate, through a comparative, historical institutionalist approach.

The chapter is structured as follows. Section 4.2 states the research problem in generic terms as one of causal inference in the presence of complexity. I provide an overview of the main features of case- and variable-oriented approaches to causal inference, identifying the main strengths and weaknesses of each, and the contexts in which they are appropriate. In section 4.3 I conclude that both case-and variable-oriented approaches are pertinent with respect to my research problem, and justify a 'nested', mixed method approach to examining the effects of the elimination of LCRs. In sections 4.3.1 and 4.3.2, I expound on the specific tools I employ in each stage to address each research question, justifying and describing the features of a difference-in-difference panel regression model and historical institutionalist, comparative case studies. Section 4.3.3 provides a statement of my final research questions.

4.2 CASE- AND VARIABLE-ORIENTED METHODS AND JUSTIFICATION FOR A MIXED-METHOD APPROACH

4.2.1 Statement of the research problem as empirical impact evaluation

My research is concerned with causal attribution and explanation relating to the impacts[42] of the implementation and elimination of LCRs. My principal concerns are the questions of empirical

[42] 'Impact' has been defined by the OECD (cited by Stern et al., 2012: 6) as "positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended". Impact may be seen as synonymous with 'effect' and 'outcome' in most respects, with 'impact' emphasising the long term, comprehensive nature of the phenomena to be examined.

impact evaluation (Stern et al., 2012): whether interventions 'work' as intended (i.e. whether a specified impact arises), to what extent they work (i.e. the magnitude of the impact), for whom they work (i.e. differential impacts within and between groups), and (perhaps) how they work (i.e. the causal mechanisms through which impacts arise).

All of these questions presuppose, and seek to examine, causal relationships between the policy interventions on one hand and impacts on the other; claims about causality thus assume that variables act systematically to produce regular outcome; following Gerring (2005: 169) "we strive for knowledge of the humanly created world that is systematic, empirical, falsifiable, replicable and, in some sense, 'objective'". To this extent, my approach is broadly positivist. The key methodological questions concern the extent to which we are able – in practice – to generate such knowledge, rather than whether such regularity really exists; and how best to do so, given the phenomena in question.

One of the most important distinctions is between experimental and non-experimental (or observational) designs. 'True' experimental designs permit the researcher to determine the application of the treatment, and through random allocation of units of analysis into 'treatment' and 'control' groups, obtain unbiased estimates of the treatment's impacts. Thus, randomised control trials are considered the 'gold standard' of impact evaluation methods. However, for reasons that should be obvious, the process of randomising a policy treatment is not feasible in the case of the elimination of LCRs; social scientists are frequently obliged to rely on observational data.

Non-experimental designs comprise the remainder of impact evaluation methods. Within quantitative methods, there are a number of ways in which researchers can estimate the counterfactual when they are unable to manipulate the assignment of treatment and control groups. Quasi-experimental designs seek to replicate the 'gold standard' by estimating a counterfactual that approximates conditions prevalent in the treatment groups. Natural experiments exploit a serendipitous variation of exposure to treatment that arises from an exogenous source. Statistical designs aim to control for heterogeneity between treatment and control groups by including confounding covariates. Under certain circumstances – when specific assumptions regarding the exogeneity of placement into treatment and control groups hold – the coefficients on dummy variables indicating the presence of treatment enable causal inference based on the provision of unbiased estimates of 'average treatment effects'. Elements of each of these designs feature in my own research design, as I discuss in greater depth in section 4.3.1 below.

Beyond quantitative approaches to impact evaluation, Stern et al. (2012) identify theory-based, case-based, participatory and synthesis (i.e. meta) evaluations. Case-based approaches examine individual phenomena in greater detail than that permitted by most quantitative analyses, allowing researchers to situate large numbers of variables in their wider context, and to examine causal mechanisms and processes. Advances in comparative case techniques also permit "new opportunities for causal analysis" in relation to causal attribution (ibid.: 27; see also Rohlfing, 2012).

Since my research questions are empirical in nature, I discount theory-based approaches, while participatory and meta analyses are not appropriate due to the type of impact I am examining and the lack of existing studies, respectively. Therefore, the remainder of this section will relate to non-experimental designs that are appropriate to my research problem. In particular, I contrast

the key features of quantitative (or 'variable-oriented') and qualitative (or 'case-oriented') approaches throughout[43].

According to the Collier and Brady, all studies based on observational data are faced with the same, fundamental methodological difficulty: that of eliminating rival explanations in the absence of a counterfactual. There are a number of discussions in the literature relating to the 'methodological divide' between quantitative / variable-oriented and qualitative / case-oriented approaches (Collier and Brady, 2004; Mahoney and Goertz, 2006; Mahoney and Goertz, 2012; Shalev et al., 2007). While the differences between the schools may be exaggerated – for example, scholars such as King et al. (1994: 4) have posited that differences are "methodological and substantively unimportant" – following Mahoney and Goertz (2006: 228), I aim to present a stylised view of each and describe "dominant norms and practices".

Throughout the discussion, I highlight the strengths and weaknesses of each approach for addressing different elements of my overall research problem. I conclude that case-oriented and variable-oriented methods may offer distinct and complementary insights into the evaluation of the impacts of the TRIMs agreement, justifying a mixed method, 'nested' approach. "Once we acknowledge that not all analytic goals can be achieved simultaneously… then it is easier to move toward a recognition that alternative methodological tools are relevant and appropriate, depending on the goals and context of the research" (Collier and Brady, 2004: 9). The appropriateness of each school of methods, and more specific methodological tools, depends upon how the associated norms and assumptions fit with the research problem at hand. In addition, because the following discussion serves to identify the generic limitations of case- and variable-oriented approaches, it frames my choice of specific methodological tools as I try to overcome and mitigate any limitations.

4.2.2 Generic features of case- and variable-oriented analytical approaches

4.2.2.1 Explanatory goal and basis for causal inference and

One of the most fundamental differences between variable- and case-oriented methods relates to what they seek to explain. The aim of variable-oriented research is to estimate the average "effects-of-causes" across a population of cases; that is, the average causal contribution of each variable specified in the model to the outcome(s) of interest (Goertz and Mahoney, 2012. Thus, such approaches seek to simplify explanations by estimating the direction and magnitude of the most important or theoretically interesting causal factors, and relegating others to the error term. As Hsiao (2007: 8) puts it, "it is neither feasible nor desirable to include all the factors affecting the outcome (…) in a model specification, since the purpose of modelling is not to mimic reality but to capture the essential forces affecting the outcome. It is typical to leave out those factors which are believed to have insignificant impacts *or are peculiar to certain individuals*" (my emphasis). In contrast, case-oriented researchers generally seek to identify specific "causes-of-effects", starting with a given outcome or empirical 'puzzle' that requires explanation and

[43] In the following discussion, I use the terms variable- and case-oriented as opposed to quantitative and qualitative. Firstly, as argued by Garborino and Holland (2009) the latter two terms more appropriately refer to the type of data used, rather than the method of analysis. Case studies, which are broadly considered as 'qualitative' in terms of the method of analysis, may predominantly or wholly utilise quantitative data. Secondly, we are concerned solely with methods aiming to demonstrate some form of causal relationship, and therefore wish to avoid confusion with interpretivist, post-modern, or descriptive analyses which are perhaps more commonly associated with a 'qualitative' ontological and epistemological stance and for which causal inference is not the aim.

uncovering the wider context in which the outcome occurs; the aim is to fully identify the complex and idiosyncratic conditions that leads to each case-specific outcome.

Another way of conceptualising this crucial difference between the two approaches is to distinguish the variable-oriented goal of causal attribution through the identification of statistical relationships between variables, with the case-oriented goal of causal explanation, which is associated with the identification of 'causal mechanisms', by which we mean "intervening processes through which causes exert their effects" (Mahoney and Goertz, 2012: 100). Within the case-oriented paradigm, "researchers carry out this assessment by attempting to observe mechanisms through process tracing… within-case analysis of specific cases and the effort to observe mechanisms go together quite naturally". In the words of Hall (2006: 27-28), process tracing

> assumes that observations bearing on a theory's predictions about the process whereby an outcome is caused provide as relevant a test of that theory as predictions about the correspondence between a few key causal variables and the outcomes they are supposed to produce.

These forms of within-case analysis may be contrasted with variable-oriented approaches through which causal inferences are drawn from 'cross-case' analysis of associations between independent and dependent variables ('causes' and 'effects'); the perspective is typified by Abell's (2004, cited in Bennett and Elman, 2006: 458) observation that "we cannot… speak of causal explanations until we have located a secure generalization by comparing cases… and protected our conclusions against any chance or spurious associations".

According to George and Bennett (2005: 207), within-case analysis thus offers "an alternative way for making causal inferences" when controlled comparisons are not feasible. However, the differences should not be exaggerated; it can be argued that both within- and cross-case analysis operate on the basis of counterfactual or 'difference making' reasoning; outcomes – whether intervening processes and mechanisms or final effects – must be explained by differences in explanatory factors. Approaches to causal inference are all attempts to solve the counterfactual problem: that we cannot directly observe the outcome that would have occurred in the absence of the hypothesised cause (Collier and Brady, 2004: 25). The crucial difference is that in within-case analysis, the counterfactual is often hypothetical or implicit. It should also be noted that, as discussed below, case-oriented approaches can also incorporate cross-case analysis when multiple cases are compared.

4.2.2.2 Population of interest

Thus, following Ragin (2000), it is understood that variable-oriented analyses assume causal homogeneity with a relatively large population of interest; cases are treated as part of a random sample within larger hypothetical population, and the significant differences between them are adequately captured by quantitative indicators, e.g. introduced as control variables. As Ragin notes, however, this assumption is often challenged from the alternative case-oriented perspective that units may vary in *qualitative* terms: that there may be differences in *kind* as well as in *degree* within a given population. It may be more appropriate under these circumstances to analyse more limited populations.

Due these differences, there may be an inherent tension or trade-off between the identification of causal regularities, enabled by statistical analysis of a large population, and the exploration of diversity among cases which is enabled by focusing on a more limited subpopulation; the problem is striking a balance between the two goals.

> Social scientists like to generalize about causes. If they can, they try to identify powerful generic causes that are relevant to broad populations… But there can be too much of a good thing. Social scientists' preference for broad generalizations often leads them down a path of excessive abstraction and away from understanding diversity (Ragin, 2000: 88-93).

The concerns of the researcher, in this context, include the extent to which the impacts arising from the elimination of LCRs are amenable to broad generalisation across a large (global) population characterised by causal homogeneity, and the extent to which they are best understood as embedded in the complex specificity of the contexts in which they occur.

It seems evident that countries that implement LCRs are likely to have specific characteristics (i.e. an automotive sector dominated by foreign MNCs and an underdeveloped or uncompetitive supply sector) that means that their 'path' to improved industrial performance may follow a different 'catch-up' logic in which the impacts of specific policies is different from their impact in countries with more established automotive sectors. Whereas in the variable-oriented approach these might be viewed as differences *in degree*, sufficiently captured by variation in the level of covariates, in the case-oriented approach one might consider these to be differences *in kind*. As a result, the population of interest may be defined more narrowly.

4.2.2.3 Data requirements

In case-oriented research, entities are examined in their entirety, i.e. in their full context. This usually implies two related characteristics: the number of cases is small, and the number of variables is large. Case-oriented analyses may incorporate 'thick' data on all relevant concepts and variables of interest which may include institutional and historical detail not amenable for quantification and richer, often country-specific, sources of data. In turn, this permits the elaboration and exploration of an analytical framework of complex and conjunctive causation in which the context in which policies are embedded – and by extensive their timing and sequencing with respect to other causal conditions – plays an important part in the determination of their impacts, as discussed below. As already noted, case-oriented research also implies the analysis of data on intervening causal mechanisms and processes. As Hall (2006) explains, "the investigator should seek as large and diverse a set of observations as feasible from each case. *Ceteris paribus*, a theory that survives tests against more observations of different kinds is more likely to be valid than one tested against a smaller or more homogenous set of observations".

In variable-oriented research, on the other hand, cases are rendered invisible except for "as the source of a set of empirical observations on dependent and independent variables" (Shalev et al., 2007: 263). The power of statistical tests rests on the number of cases (or, more accurately, of observations). These attributes have additional implications for the data requirements of each type of analysis. Variable-oriented analyses require a relatively limited number of indicators – i.e. those which exhibit significant effects on outcomes of interest – but they must be standardised for comparison across cases, precisely and quantitatively measured, and available across a larger population. The value of statistical models will therefore depend on how well conceptual and theoretical frameworks can be operationalised, for example in terms of the incorporation of appropriate control variables. In this regard, as Shalev observes, "macro-comparative research is also dogged by the ambiguity of many of the variables of interest and the difficulty of measuring them precisely" (Shalev et al., 2007: 266). This limits the number of sources of data that may be incorporated into analysis; the restriction may be particularly onerous when carrying out panel data analysis, as some relevant indicators may not be available for the full time period under investigation, although some missing data are acceptable provided there is no systematic bias

that may affect the estimation of parameters. The feasibility of variable-oriented approaches in the present context thus depends upon the availability of data through which to model the determinants of industrial performance outcomes, including the number of cases for which observations are available.

4.2.2.4 Treatment of causal complexity and heterogeneity

According to a number of commentators, one of the most important differences between variable- and case-oriented approaches is their treatment of causation (Mahoney and Goertz, 2006; Shalev et al., 2007). While it is true that "both quantitative and qualitative researchers assume that causal patterns in the real world are in certain ways quite complex… the form of causal complexity varies across the quantitative and qualitative paradigms" (Goertz and Mahoney, 2012: 56).

Case-oriented approaches generally assume a view of causation in which necessary and sufficient causes are distinguished (Ragin, 2000)[44]. The criteria for identifying sufficient and necessary conditions are straightforward. In the case of sufficient conditions, all instances of the cause must lead to the effect; in the case of necessity, all instances of the effect must include the presence of the cause. In fact, there are few causes that are strictly sufficient and necessary for an effect to take place. Case-oriented scholars have developed the concepts of the INUS condition: an "insufficient but non-redundant part of an unnecessary but sufficient combination of conditions". In other words, INUS conditions are those that are individually neither necessary nor sufficient to an effect to occur, but which are necessary parts of a conjunction of conditions, which may itself be sufficient for an effect to occur[45]. Such a view of causation relates to the idea of equifinality, that is, the possibility that there are multiple (but limited) "causal paths to the same outcome" (Mahoney and Goertz, 2006: 232) as well as the conceptualisation of complexity in terms of 'conjunctional causation'. Following Rihoux (2006: 682), this implies that:

> 1) most often, it is a combination of conditions (independent variables) that eventually produces a phenomenon – the outcome (dependent variable); 2) several different combinations of conditions may produce the same outcome; and 3) depending on the context, on the conjuncture, a given condition may very well have a different impact on the outcome. Thus different causal paths – each path being relevant, in a distinct way – may lead to the same outcome.

Furthermore, in the presence of cumulative causation and positive feedback, it is commonly assumed in case-oriented research that variables may exhibit dynamic causal asymmetry: "the movement of a variable, say from presence to absence, does not have the same impact as moving in the other direction" (Goertz and Mahoney, 2012: 64), but rather, may give rise to irreversible

[44] In this view, X is a sufficient cause of Y to the extent that Y always occurs wherever X is present. Certainly, this could be considered a causal relationship. But we can also conceive of causes that are not sufficient, i.e. in which every instance of X does not necessarily lead to Y. Brady (2008) offers the example of the causes of a fire. "Striking a match, for example, may be necessary for it to light, but it may not light unless there is enough oxygen in the atmosphere. Is striking a match never a cause of a match lighting? This leads to an alternative definition in which "X is a cause of Y if and only if X is necessary for Y". This definition of a necessary cause suggests that it must be present but will not always lead to the effect.

[45] To illustrate, consider again the example of the causes of a fire, following Brady (2008), who hypotheses a scenario with two possible ways in which a fire may occur: through a combination of an electrical fault (A) heating a wooden framing (B) or a gas canister (C) exposed to an open flame (D). Such a scenario of INUS causes may be expressed through the following Boolean equation:
Y (fire) = (A AND B) OR (C AND D)

outcomes by foreclosing (or reducing the likelihood of) other possibilities (causal paths) from occurring (Pierson, 2000: 251).

In contrast, the perspective embodied in variable-oriented research such as multiple regression is (often) epitomised by assumptions about the linear additivity or marginality of causal effects (Shalev, 2007: 264; Mahoney and Goertz, 2006: 233). Linear additivity refers to an understanding of causation in which variables exert an independent and consistent effect across all cases, time periods and contexts, which is estimated under the assumption that other variables remain constant; coefficients are added to estimate the combined effect of multiple variables. Heterogeneity between cases is usually captured through the identification and inclusion of other control variables in the statistical model. In the terms of Goertz and Mahoney (2012), the relationship between the independent variable (the presence of LCRs) and the dependent variable (industrial performance outcome) implied by this model is characterised by 'dynamic causal symmetry'. That is,

> with a fully symmetric causal effect, X will have the same effect on Y regardless of the direction of change. One can view this kind of causal symmetry in terms of a counterfactual: causal relationships are symmetric when they are counterfactually reversible. The effect on Y of a given change on X would disappear if X returned to its original value (ibid.: 64).

Linear additivity has been heavily criticised as overly simplistic; "all too often general linear models have led to general linear reality, to a limited way of imagining the social process'' (Abbott, 1998): linear additivity does not adequately capture the nature of the causal relationship where conjunctive and cumulative causation, and causal heterogeneity, are present[46]. For example, in the case of INUS conditions, it is a combination of causes that raises the probability of the event: the presence of each cause individually – holding others equal – would not do so, although general linear models would produce estimates to that effect[47].

Of course, quantitative statistical models can account for heterogeneous causal effects with the incorporation of interaction effects[48] and multilevel models, and mechanisms of positive feedback may be incorporated as quadratic terms and lags. However, these techniques are often infeasible as a result of data requirements[49]. In any case, the crucial difference between the two approaches is that in case-oriented research, "one often focuses primarily on the impact of combinations of

[46] As noted in Shalev et al. (2007: 264) "Abbot notes the constricted theoretical scope of the notion of causality underlying linear models, which cannot recognize (or at least is unlikely to recognize) situations where the effect of any given causal variable is uneven, contradictory (dialectical), or part of a wider bundle of factors sharing an elective affinity".

[47] To continue the example above, the probability of a fire starting expressed in a linear additive model would be as follows:

$Y = \beta_1 A+\beta_2 B+\beta_3 C+\beta_4 D$

The coefficients would incorrectly imply that each INUS condition had an individual and independent causal effect on the outcome Y.

[48] The equivalent of the equation in footnote 47 above can easily be expressed using statistical language in the following model:

$Y = \beta_1 A+\beta_2 B+\beta_3 C+\beta_4 D+(\beta_5 A*B)+ (\beta_6 C*D)+\varepsilon$

Here, we assume that a fire occurs once Y reaches a certain threshold; higher coefficients for each causal condition raise the probability of the event occurring. However, coefficients for β_1- β_4 would be correctly estimated as zero, to reflect the individual impact of each variable on the probability of fire occurring.

[49] As Shalev et al. (2007: 264) observe, the problem is not that variable-oriented research "does not have or could not invent technologies for dealing with such complexities… The point is that because such techniques are either difficult to employ or impose a steep statistical penalty due to the ''small-n problem'', they are rarely or insufficiently used".

variables and only occasionally focuses on the effects of individual variables… in the quantitative tradition, by contrast, one is more likely to be focused on estimating the effect of individual causes" (Mahoney and Goertz, 2006: 235).

Clearly then, the utility of each approach for examining depends upon the extent to which the elimination of LCRs is usefully conceptualised as an independent, marginal cause, or in conjunction with conditions with which their effects are jointly determined. It also depends upon the necessity and feasibility of incorporating more advanced functional forms into the statistical model, given the availability of data.

4.3 JUSTIFICATION FOR A MIXED METHOD, 'NESTED' APPROACH TO THE RESEARCH PROBLEM

It is clear from the above discussion that both case- and variable-oriented methods have specific strengths and weaknesses for answering different types of research question and depending upon the availability of data. Our ability to carry out valid and reliable analyses, and the viability of each specific method, depend upon the practicalities of data availability as well as issues of conceptualisation and operationalisation with respect to the determinants of industrial performance.

As summarised concisely by Khandker et al. (2010):

> Impact evaluations using quantitative data from statistically representative samples are better suited to assessing causality by using econometric methods or reaching generalizable conclusions. However, qualitative methods allow the in-depth study of selected issues, cases, or events… There are significant trade-offs in selecting one technique over another.

The conceptual and theoretical framework developed during the course of the previous two chapters suggests that the elimination of LCRs may give rise to a common effect that can be inferred from cross-case comparison based on the association of this cause with industrial performance outcomes, subject to sufficient controls being introduced to capture heterogeneity at the country level. At the same time, the specific effects of LCRs (and their elimination) are likely to be contingent on wider contextual factors, such as the capabilities and advantages of each country, examination of which is facilitated through within-case analysis of causal mechanisms.

Therefore, both the "effects-of-causes" and "causes of effects" explanatory goals are relevant in the context of my research problem. I am interested in estimating the average causal effect of the elimination of LCRs over the wider population through comparison between the countries in which the prohibition of LCRs required a domestic policy change and those in which it did not. I am also concerned with a more holistic understanding of the causal mechanisms contributing to this effect and the explanation of divergent outcomes within the narrower population of countries in which LCRs were in force prior to the TRIMs Agreement.

The evaluation of the elimination of LCRs thus provides an interesting context in which to carry out – and also evaluate the utility of – mixed method research. There are a number of distinct methodological justifications for mixed method approaches to impact evaluation. Following Garborino and Holland (2009), quantitative and case study methods may be integrated for several reasons, each of which is pertinent to my own research design. Firstly, one method may be employed as a preliminary stage to another (principal) method. For example, quantitative research may be carried out in order to identify appropriate cases for comparison; or qualitative research may be used to inform the construction of a quantitative model, in terms of the conceptualisation and operationalisation of covariates. Similarly, the first stage may be used to develop hypotheses to examine with further research.

Another reason to use mixed methods is the triangulation of findings. Triangulation aims to enhance the validity of findings by comparing data obtained from different sources (and potentially using different methods of data generation). As Bamberger observes, "when estimates from different sources converge and agree this increases the validity and credibility of findings or interpretation. When different estimates are not consistent, the researcher explores further to understand the reason for the inconsistencies" (2012: 4).

A third justification is to use the different methods to explain or examine different aspects or sub-questions of the research problem, or to build on the findings of one method with another, thus making the findings more comprehensive. As described above, a quantitative impact evaluation may address questions relating to the presence, direction and magnitude of a causal relationship, while qualitative methods may be used to examine the causal mechanisms and processes through which causation is manifest.

I have elected to pursue a nested approach[50] (following Lieberman, 2005), in which the advantages of each approach are not only combined, "but also there is a synergistic value" in the manner in which the stages of my research are sequenced; variable-oriented analysis feeds into my case studies by providing data on which to base my case selection, and, at the same time, the quantitative analysis leaves unanswered a number of complementary but distinct research questions. To the extent that both stages pertain to the same overarching research – assessing the developmental impacts of restrictions on policy space restrictions in the context of LCRs in the automotive sector – they also provide an opportunity to triangulate findings arising from different data sources and analytical frameworks.

4.3.1 Variable-oriented / quantitative approach

Large-n variable-oriented analysis is employed as the first stage to compare the aggregate impacts of the elimination of LCRs between countries based on whether LCRs were in force at the time the external policy restriction was imposed; the aim here is to "gain inferential leverage in addressing rival explanations" by maximising the number of observations (Collier and Brady, 2004: 11). As I acknowledge in the following sections, "behind the apparent precision of quantitative findings lie many potential problems concerning equivalence of cases, conceptualization and measurement, assumptions about the data, and choices about model specification such as which variables to include. The interpretability of quantitative findings is strongly constrained by the skill with which these problems are addressed" (Collier and Brady, 2004: 9-10).

As succinctly summarised by Rodrik and Rodriguez (2001), Winters (2004), Akyüz (2005b) and Chang (2005), econometric work on causal relationships between trade policy and economic performance face a number of difficulties. These include problems measuring trade policy stances[51] and conceptual problems relating to causal inference. The difficulties relating to

[50] This approach "combines the statistical analysis of a large sample of cases with the in-depth investigation of one or more of the cases contained within the large sample" (Lieberman, 2005: 435-6).

[51] A number of largely discredited studies (e.g. Dollar, 1992; Sachs and Warner, 1995) take trade openness (measured by the ratio of trade to GDP for example) as a proxy for trade policy, neglecting that trade openness is itself a consequence of strong economic performance as well as of the policy regime, and thus subject to intractable issues of endogeneity (Chang, 2005: 69). In other studies, the readily quantifiable nature of the main instrument of protection as well as the availability of fine-grained and comprehensive data, have led to protection and liberalisation being operationalised in terms of average tariff rates (Rodrik and Rodriguez, 2001: 262). However, as Wade (1993) convincingly demonstrates with respect to Taiwan, low average tariff rates can mask considerable variation, while gradual liberalisation is consistent with the rationale for infant industrial protection (as discussed below). Relatively low nominal tariff rates can also mask extremely high effective rates of protection for the assembly sector, as discussed in section 3.6.2.2

causality are more fundamental. There are major problems distinguishing correlation from causality, and determining the direction of the latter, where an association between liberalisation and improved performance is found (Akyüz, 2005). Ultimately, the statistical difficulties involved in causal inference are extremely difficult to overcome – especially so in cross-sectional regression – for several major (and related) reasons. Firstly, policy stance is partly determined by economic performance, leading to problems of selection bias and endogeneity; for example, trade and industrial policies by their very nature target less competitive sectors (Rodrik, 2005).

More generally, statistical inference is only valid provided that "all units with the same value of the explanatory variables have the same expected value of the dependent variable" (King et al., 1994: 91). If we accept the view that the relationship between the policy variable and economic performance varies qualitatively in conjunction with contextual factors (e.g. relating to institutional setting and technological capabilities) such that causal effects only pertain "to a particular domain of cases" (Collier and Brady, 2004: 29), then econometric analysis that does not account for this is flawed: in technical terms "the 'homogeneity condition' is violated, producing unstable parameters" (Chang, 2005: 69). Even when policies may be assumed to exhibit a consistent, homogenous effect across heterogeneous unit, there are many factors which co-determine economic performance; as Akyüz (2005b: 18) puts it, "while trade policy itself has an independent influence on the chances of success of an industrialisation strategy, empirical techniques used cannot always separate its effects from those of a host of other factors". My approach to overcome these methodological difficulties are outlined below, before more comprehensive discussion in chapter 5.

4.3.1.1 Difference-in-difference panel regression

I take advantage of the opportunity of a natural experiment in the form of an exogenous policy restriction to minimise the usual issues with respect to endogeneity of the decision to engage in liberalisation. As a result of the multilateral nature of TRIMs restrictions, in which countries were permitted a narrow timescale in which to remove prohibited policies, the elimination of LCRs was exogenously determined[52] (although as discussed below, implementation in the first place was not, leading to the problems of selection bias).

The problem of measuring trade policy stance has been simplified by the existence of comprehensive data on the incidence of LCRs in the post-WTO period, as discussed in section 3.5.4, which permit the construction of a dummy variable, as discussed in section 5.4.1 of the following chapter, corresponding to instances in which LCRs were implemented in the automotive sector to support domestic intermediate goods producers. This allows the possibility of evaluating the impact of LCRs targeted at performance in this narrow subsector, in which there are (relatively) few confounding factors, compared to the determinants of industrial performance

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and footnote 40. Finally, a number of studies (e.g. Greenaway et al., 2002; Santos-Paulino and Thirwall, 2004; Wacziarg and Welch, 2008) seek to pinpoint the timing of instances of liberalisation in time-series or panel models. These studies are more methodologically robust, and most closely relate to my own research design, but their results are still highly sensitive to the operationalisation of liberalisation episodes.

[52] This is not usually the case, as policies are determined politically and will typically be phased out when they have achieved their aims, or because they are unsuccessful, for example – and will therefore be endogenously associated with the performance outcome. The exogeneity condition is not quite satisfied, since countries were able to request extensions and therefore didn't eliminate LCRs simultaneously; this may bias the estimation of the post-treatment coefficient if governments have prolonged the use of LCRs such that they are endogenously related to performance outcomes, i.e. either because they wish to continue with the implementation of a successful policy or because the goals of the policy have not yet been achieved. However, extensions were strictly time-bound, and in addition, I control for pertinent covariates affecting performance outcomes, as discussed below.

more broadly. In other words, the policy impact is (more) likely to be large enough to show up against 'noise' in the data.

Although there is some diversity in the specificity of design and implementation of LCRs, in practice they are similar enough to warrant the assumption of causal homogeneity: they have been used to promote import substitution (localisation) and, ultimately, export competitiveness in the parts and components subsector. This assumption is necessary in order to permit any generalisation about the effects of the implementation and elimination of LCRs *per se,* although I acknowledge that features of design – e.g. the proportion of local content required, the process of consultation through which the mandated proportion of local content was determined, whether LCRs were mandatory or attached to incentives, and the nature of incentives – are, in fact, subject to variation between different countries, as I discuss below.

The construction of a dummy variable signifying the elimination of LCRs permits comparison of performance outcomes over time and across groups, according to the logic of the difference-in-difference (DID) design, as explained below. In the most basic form of the DID design, there are two time periods under consideration: pre- and post-treatment. These correspond to the periods in which LCRs were permitted, and were practiced in a number of countries (pre-treatment) and in which LCRs were prohibited, and phased out (post-treatment). Treatment and control groups are based on the distinction between countries which were required to eliminate LCRs in intermediate goods in the post-treatment period, and those which were not. This simple heuristic framework thus permits comparison of performance outcomes between the two time periods and groups of countries. Performance outcomes must be amenable to quantitative measurement, such that we can identify whether they are positive or negative in the post-treatment period in relation to the pre-treatment time period, establishing the first difference in performance outcomes. The second difference – the DID – is simply the difference between the first differences of the treatment and control groups. The DID comparative framework is illustrated in figure 4-1 below, for heuristic purposes.

Figure 4-1: Difference-in-difference research design as a comparative framework

	Pre-treatment	**Post-treatment**	**First difference**	**Difference-in-difference**
Treatment	Performance outcome A	Performance outcome B	Change in outcome over time E (= A – B)	Difference in changes in outcomes over time (= E – F)
Control	Performance outcome C	Performance outcome D	Change in outcome over time F (= C – D)	

This design removes some sources of endogeneity and group-level heterogeneity, because we are effectively able to control for initial differences in performance outcomes between groups. The crucial assumption of this approach is that in the absence of the policy treatment, performance outcomes in both the treatment and control groups would have experienced the same trends over time. These issues are explored further in chapter 5, in which I generalise the DID approach to a panel data specification incorporating fixed country effects. To the extent that time trends are unlikely to have been homogenous across the treatment and control groups, the use of panel data permits me to operationalise the crucial time-varying determinants of industrial performance in the parts and components sector – industrial capabilities and market size – in order to control for these factors.

Four main limitations of this variable-oriented approach motivate my decision to carry out complementary case-oriented research. Firstly, I wish to relax the assumption of causal homogeneity across the entire global population, which implies that the only pertinent difference

between the groups – other than that captured by industrial capabilities and market size covariates – pertains to the fact that the treatment group have undertaken policy reform, whereas the control group have not. As a result, the DID estimator is intended to capture a hypothetical causal effect applicable to the wider population of countries. In reality, there are likely to unobserved factors associated with the decision to implement such policies that suggest the existence of a qualitatively distinct subpopulation of LCR-users (as discussed below).

Secondly, the idea that the elimination of LCRs would exert a homogenous effect, even across this narrower population, contradicts our understanding of most causal relationships as contingent on the interaction or conjunction of various conditions, and are subject to non-linear dynamics such as positive feedback mechanisms. While variable-oriented approaches necessarily simplify complex relationships, elements of these are perhaps best examined using alternative approaches. As the empirical evidence clearly demonstrates, motivations are not uniform across countries, which may have the characteristics of developmental or predatory states with implications for their capacities to resist protectionist pressures from domestic rent-seeking lobbies, design effective policies, and encourage technological accumulation more generally (Evans, 1995). More generally, the effects of LCRs and their elimination are expected to be contingent on their conjunction with a host of locational advantages. Although in principle, it may be feasible to model heterogeneous policy impacts using interaction terms and multilevel techniques, these techniques have considerable data requirements and due to the degrees of freedom problem, were not feasible in the present case.

Thirdly, the DID approach does not permit exploration of the possibility that LCRs are subject to non-linear dynamics such as positive feedback mechanisms. The approach implicitly assumes dynamic causal symmetry. Performance outcomes are explicitly compared across the pre- and post-treatment periods; to the extent that the period in which LCRs were eliminated is characterised by a given change in performance outcomes – either positive or negative – the model posits that the outcomes that pertained during the period in which LCRs were in force were necessarily the converse. The logic of the case-oriented stage is different: while eliminating LCRs may have had a positive impact, LCRs may also have improved performance. Both policy stances (protection and liberalisation) are part of a sequenced strategy, the appropriateness of which is determined by causal conditions that pertain in each time period (consistent with the logic of infant industrial protection).

Finally, in common with most variable-oriented approaches, the DID approach described here does not attend to causal explanation through the examination of causal mechanisms, but rather to causal attribution through statistical association. As such, without specification of the specific mechanism through which the observed association occurs, explanations are necessarily incomplete, particularly when more than one plausible narrative of causal mechanisms exists (George and Bennett, 2005: 225).

4.3.2 Comparative case-oriented approach

As a result of these limitations, my quantitative analysis feeds into small-n, case-oriented analysis. There are several ways in which the purpose and analytical logic of my case studies differ from those of the panel regression analysis.

In this stage, it is not my intention to identify a general causal effect arising from the elimination of LCRs, which is facilitated, in the quantitative stage, by the statistical properties of the large sample size. Instead, I am interested in the examination of the causal mechanisms through which relationships between causes and outcomes are established – namely the activities, decisions and strategies of local and global firms in response to the advantages and policies in different countries – and the role of the implementation and elimination of LCRs therein. These causal

mechanisms are explored largely through the incorporation of richer, often country-specific sources of data, including secondary data sources.

Besides permitting me to explore causal mechanisms, case studies allow more comprehensive operationalisation of location-specific advantages and policy factors that are either omitted from or are only partially captured by the DID approach described above. This opens up the possibility that the impacts of the implementation and liberalisation of LCRs have been confounded by wider policies affecting automotive sector development, including alternative policies promoting parts and components sector development. Thus, I am interested in examining causal conditions in their entirety and how they have combined to produce the observed industrial performance outcomes in different contexts. In turn, this facilitates the elaboration and exploration of an analytical framework of complex and conjunctive causation in which the context in which policies are embedded – and by extensive their timing and sequencing with respect to other causal conditions – plays an important part in the determination of their impacts. The most appropriate analytical framework for analysing these types of effects is historical institutionalism, and that is the approach I adopt here.

4.3.2.1 Historical institutionalism

Historical institutionalism can be seen as an analytical approach rather than a specific method, the main features of which include the prioritisation of detailed, case-specific analysis; a particular focus on institutions, broadly understood as the formal and informal rules, organisational structures and norms that shape actors' behaviour; the importance accorded to contextual factors shaping policy and institutional outcomes; and the importance accorded to temporal factors and dynamic, cumulative effects (Pierson, 2000; Leftwich, 2007; Steinmo, 2008). Historical institutionalism is closely associated with 'process tracing' and the examination of causal mechanisms (George and Bennett, 2005).

This approach relates to several of the core themes emerging from my literature review. Firstly, the institutional capacities and characteristics of the state are of crucial importance in determining industrial policy outcomes. Studies of the successful East Asian developmental states (Amsden, 1989; Wade, 1990) have shown that effective intervention is possible, and have documented the conditions in which states have been able to simultaneously stimulate and discipline private capital; these conditions, relating to the 'embeddedness' of state actors within private capital, and the quality of the bureaucracy, have been explored in historical, comparative work by Evans (1995) and Kohli (2004). Historical institutionalism can thus be seen to contribute to an "increasingly sophisticated appreciation of institutions" that has "helped to shed light on key development puzzles, including the question of why similar policies in different countries often have quite different outcomes" (Doner et al. 2006b: 3).

Secondly, the outcomes of LCRs are seen as dependent on the conjunction of implementation with other conditions besides the political character of the state: advantages and capabilities at the firm and national level, including policies and institutions relating to technological learning more broadly, and the strategic priorities and governance structures that are specific to individual firms and sectors. These conditions can include external factors such as the capabilities and advantages of alternative locations for production. Much of the existing research into automotive policy regimes and the dynamics of global automotive value chains, reviewed in the previous chapter, comes from a historical institutionalist perspective (e.g. Humphrey et al., 2000; Carrillo et al. (eds.), 2004; Doner et al., 2006a, 2006b; Sturgeon et al., 2008; Wad, 2008). Such a perspective permits the researcher to fully explore the complex interplay of lead firm strategies, supply and

demand conditions, and policy and institutional factors that contribute to specific patterns of production, trade and investment and which are unlikely to be captured by simpler methodological tools.

The interaction of policies and institutions with wider contextual factors further implies "two types of historical contingency: temporal context (period effects) and time paths (particular historical sequences or cumulations)" (Shalev et al., 2007: 264). An historical orientation – beyond the trivial acknowledgement that social phenomena are affected by preceding circumstances and events – is justified. For example, the feasibility of local suppliers achieving efficient levels of production in relation to alternative sources of supply may change as a result of technological advances that permit coordination of productive activities over greater distances, including reductions in transport costs, and as geographically proximate locations develop their own supply capabilities. It is plausible that in one temporal context, LCRs would be an effective means through which states could alter arbitrary flows of investment in their favour; in a later period, having not been implemented in the previously favourable circumstances, LCRs may cease to be effective if, for example, an alternative location has become established as a competitive producer. Thus, "specific patterns of timing and sequencing matter"; widely divergent outcomes may arise as a result of positive feedback effects which foreclose other possibilities (paths) from occurring (Pierson, 2000: 251). Positive feedback occurs when constant returns to scale, agglomeration effects, and dynamic processes of learning lead to 'stickiness' of industrial locations; these phenomenon clearly pertain to industrial development and the impacts of industrial policies. Historical institutionalism thus takes seriously the notion that timing and sequencing of reform may be of crucial significance.

Specifically, the historical institutionalist approach is congruent with a conceptual and theoretical framework in which the impact of the elimination of LCRs may be conditional on the impact of the implementation of LCRs and other policies in the previous time period; that the impact of LCRs elimination may be influenced by the cumulative impacts of the causal mechanisms for which LCRs provided an impetus, whether positive or negative. For example, in the case of the former, LCRs may have encouraged import-substituting inward investment that gave rise to subsequent improvements in performance through the mechanisms of technological learning and achievement of greater economies of scale. In the case of negative impacts, LCRs may have deterred investment such that even if the business environment improved post-liberalisation, existing capabilities were not sufficient to take advantage of the increased market opportunities and local firms eliminated by the influx of competition.

4.3.2.2 Comparative strategy

The other key feature of my case studies is their multi-case, comparative nature. Case studies need not be comparative. Within-case analysis does not rely on comparison, and can fruitfully be carried out for single cases. In other words, case study analysis would make a valuable contribution to my research question even if no explicit comparisons were made – by providing "an in-depth insight" (Rihoux, 2006: 680) into the relationships between causes and outcomes via causal mechanisms. However, comparison also facilitates the additional and "apparently contradictory" goals of generalisation and cross-case causal inference in the context of case-oriented analysis (ibid.).

Comparison can occur at two different levels, within- and cross-case, corresponding to whether cases are compared with respect to their mechanisms or their causal conditions (i.e. at the level of variables) respectively. Following Rohlfing (2012: 97):

> In principle, comparisons can be made of the cross-case level, the within-case level, and both simultaneously… A within-case comparison is appropriate for discerning whether the causal mechanism and causal processes are similar in the two (or more) cases at hand. In a cross case comparison, on the other hand, one is determining the nature of the causal effect of a given cause.

Both levels of comparison are interesting and important in relation to my research. All of the countries under examination here are considered as part of a causally homogenous population with respect to the impact of the elimination of LCRs, yet exhibit considerable diversity in terms of their structural characteristics. The question of interest is whether the causal mechanisms at hand – e.g. integration into global production networks of local and foreign firms, and firm-level decisions to engage in technology transfer and upgrading – are common to more than one case, regardless of the performance outcomes exhibited by each. Thus, the commonality of causal mechanisms and outcomes in the presence of the common policy space restriction is an important concern of my research, and therefore, within-case comparison is an important aspect of my case selection strategy. The purpose of multi-case analysis in this respect is what Yin (2014: 43) calls "analytical generalization" through which we strive to "generalize a particular set of results to some broader theory". In this regard, I am motivated by a concern to cover a range of diverse and substantively interesting cases, in order to enhance the scope for analytical generalisation in the presence of similar causal mechanisms.

At the same time, to the extent that outcomes and indeed mechanisms vary across cases, these may provide insights into the divergent effects of LCRs with respect to their conjunction with wider structural factors at the cross-case level. There is considerable diversity across cases in ways that potentially influence industrial performance outcomes. In this respect, cross-case comparison can combine the strengths of within-case analysis, as described above, with causal attribution via 'difference making'. In this context, since the sub-population under examination have all implemented and eliminated LCRs, 'difference makers' are in terms of the wider location-specific characteristics which form the contexts in which reforms have occurred.

Two basic comparative strategies for causal attribution are identified in the methodological literature, emanating from John Stuart Mill's methods of difference and agreement (see, e.g., De Meur and Gottcheiner, 2009). The basic principle of the method of difference is to compare two cases that differ with regard to the outcome to be explained, and in one other respect, which is isolated as the cause. The intuitively appealing idea is that differences must explain differences; the only variable that differs must explain the outcome. The basic principle of the method of agreement is to compare two cases that have the same outcome, but differ in all relevant respects but one, which is isolated as the cause. The intuition here is the reverse of the method of difference: differences cannot explain similarities, so the variables that differ must be eliminated as possible causes of the effect.

There are serious limitations to causal inference from small-n cross-case comparisons except in the unusual circumstance that the comparison is 'ideal'[53]. However, these limitations can be

[53] Ideal comparisons are those which perfectly meet the criteria above, in that two cases are found which agree and differ in all theoretically relevant respects. In contrast, if a comparison is imperfect, the inferences that we are able to draw are indeterminate: more than one inference may be feasible (Rohlfing, 2012: 98). Even in the context of an ideal comparison – which may be very difficult to find in an empirical reality characterised by few instances of a given phenomenon – Mill's methods have been subject to much criticism. For a start, the causal inferences that arise are only valid in a highly limited set of circumstances. These circumstances include the fact that all relevant variables or conditions must be identified by the

attenuated by increasing the number of cases, restricting generalisations to narrower populations via 'scoping conditions', and thus making more conditional (contingent) generalisations (Rohlfing, 2012).

It should be mentioned, following Rihoux (2006) and other comparative methodologists, that case selection is ultimately the result of an iterative process between theoretical and empirical work. That is, theory guides case selection by presenting the empirical categories through which to view cases; and empirical examination of those cases presents the researcher with more detailed and (hopefully) valid measurement of the key variables – and thus feeds back into case selection. This implies that unlike in quantitative research, in which 'selecting on Y variables' is a source of bias, in case-oriented work, the researcher has to uncover the most pertinent aspects of diversity in causal conditions and identify positive and negative outcomes in order to select relevant cases (Mahoney and Goertz, 2012: 239-241).

In this context, I collated a considerable amount of empirical data about my cases in the course of my review of the literature on the dynamics and drivers of the automotive sector, as well as through the construction of my panel dataset. In particular, chapter 3 serves to illustrate the pertinence of regional institutional configurations and market growth to industrial performance; and through examination of parts and components sectors outcomes over time within the group of countries that have eliminated LCRs, I have identified cases with divergent levels of performance.

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researcher and specified with no measurement error, and that there are no interaction effects (or conjunctions) between those identified. Omitted variables and measurement error affect the validity of causal inferences from comparisons even before the addition of further complications (Rohlfing, 2012: 123). The researcher is faced with a trade-off, since increasing the number of variables (causes) increases the probability that the comparison is suboptimal (ibid.: 124). Perhaps more importantly – in light of the significance of complex causation and causal heterogeneity (i.e. the existence of different 'paths' to the same outcome for case-oriented researchers – causal inferences deriving from Mill's methods assume no interaction effects. Allowing for the possibility of conjunctions drastically increases the number of plausible explanations: the variable that differs (agrees) may not be the only causal explanation if it is part of a conjunction of conditions that produce the effect. "It is important to note that these inferences rest on the implicit assumption that […] variables have a causal effect on their own… Once this assumption is relaxed and one allows for the presence of interaction effects, the picture gets more complex" (Rohlfing, 2012). This can be demonstrated in relation to the concept of the 'property space', defined as the "logically possible number of combinations of cross-case scores".

Consider the following example of an ideal method of difference. Three binary independent variables, X1, X2 and X3 are measured for two cases. X3 is observed to differ along with the outcome variable Y and is inferred to be its cause.

Case	X1	X2	X3	Y
A	1	0	1	1
B	1	0	0	0

However, the data do not preclude that X3 is part of a causal conjunction with the other independent variables individually or together. Perhaps the outcome Y is produced when both X1 and X3 are present; this would not be apparent since X1 is present in both cases, and we would need to expand the comparison to include two cases without X1 in order to discount this possibility. The number of logically possible combinations of binary variables is 2C, where C indicates the number of causes. For the example above therefore, there are 8 possible combinations for causes, of which only two are compared. As Rohlfing (2012) notes, despite their obvious shortcomings, Mill's methods are the best available for a two-case comparison; their problems "are not due to how the method of agreement and difference work, but because they rely on a small number of cases. This implies that the shortcomings of Mill's methods are problems of small-n comparisons more generally" (p. 99).

In order to maximise the scope for causal inference, my approach has been to locate pairs of cases within each regional institutional configuration that can be characterised, as far as possible, as differing across a common, binary causal condition – location-specific advantages – and industrial performance outcomes. This strategy permits cross-case comparisons across two 'axes' or dimensions: within and between different regional institutional configurations. However, it should be noted that the pairwise comparisons are far from 'ideal' and that the main motivation for the case study stage of my research is to conduct within-case analysis across a sufficient number of diverse cases to permit some analytical generalisation.

In sum, my case selection strategy reflects the following goals:

- to cover the maximum feasible number of cases to allow analytical generalisation regarding the effects of the elimination of LCRs and the causal mechanisms through which these effects are manifest; and
- to draw inferences about the impacts of interactions between location-specific advantages and the implementation and elimination of LCRs using the method of difference.

4.3.3 Statement of research questions

Each stage of the research thus addresses distinct sub-questions within my overarching research question. In the first stage, I specify a panel regression model in which I control for country fixed effects and introduce covariates on national industrial capabilities and market size. The primary research question pertaining to panel regression stage is:

RQ 1. What is the nature and magnitude of the impact of the elimination of LCRs on quantitative indicators of industrial performance in the automotive parts and components sector?

Specifically, I determine whether the elimination of LCRs has led to significant changes in indicators of local content, output, exports, imports, and trade balance, in countries which have eliminated LCRs compared to countries which have not.

The case studies are 'nested' within the findings and ask supplementary questions regarding the narrower population of countries in which LCRs were exogenously restricted. They employ an historical institutionalist framework which permits examination of causal mechanisms and allows that the impacts of the elimination of LCRs are context dependent and subject to conjunctive causation and cumulative effects. The research questions pertaining to this stage are:

RQ 2. To what extent and how have LCRs contributed to performance outcomes through the causal mechanisms of FDI and developments in value chain governance?

  RQ 2.1. To what extent and how have LCRs contributed to post-liberalisation performance outcomes through cumulative processes arising in the LCRs period?

  RQ 2.2. How have the contributions of LCRs differed according to the contexts in which they were implemented?

RQ 3. To what extent and how has the elimination of LCRs contributed to performance outcomes through the causal mechanisms of FDI and developments in value chain governance?

  RQ 3.1. How have the contributions of the elimination of LCRs differed according to the contexts in which elimination occurred?

  RQ 3.2. To what extent has the elimination of LCRs precluded the promotion of local parts and components production through alternative policy instruments, and what are the implications for analyse of the elimination of LCRs?

The implications of my thesis are not solely substantive but also methodological. My research design is complicated by the difficulties involved in assessing the costs of lost policy space in the absence of a counterfactual and in the presence of profound methodological difficulties arising from causal complexity in the phenomena I am investigating. Each stage of the research dealt with these difficulties in different ways. I have thus identified a number of pertinent methodological research questions that arise from an evaluation of the contribution of the mixed method approach adopted here, and of each stage of the research design therein. The methodological contributions of my thesis relate to the following questions:

RQ 4. To what extent has the mixed method approach adopted here been able to account effectively for the complex determinants of industrial performance outcomes in the context of restrictions on the use of LCRs?

RQ 4.1. What are the relative contributions of case- and variable-oriented approaches in this regard?

Finally, as I evaluate the implications of the thesis with respect to broader theoretical debates, I consider the extent to which the findings of my research support alternative positions on the utility of retaining 'flexibility for development' within international economic governance structures (broadly speaking, the structuralist perspective) against positions that suggest that policy space restrictions are necessarily welfare enhancing for all (broadly speaking, the neoliberal perspective).

RQ 5. To what extent and how does the approach adopted here contribute to wider debates about the distribution of the costs and benefits of industrial policies and policy space restrictions more generally across structurally diverse countries?

RQ 5.1. What are the implications of the thesis, if any, with respect to developing countries' pursuit of interventionist trade and industrial policy, and their participation in multilateral negotiating fora?

These methodological and broader theoretical implications of the thesis are discussed in chapter 7.

5 PANEL REGRESSION SPECIFICATION AND FINDINGS

5.1 CHAPTER OUTLINE

In the previous chapter, I justified and described a mixed-method approach to analysing the impacts of the elimination of LCRs. The first stage I depicted the use of the 'difference-in difference' (DID) research design as a comparative strategy, enabling the comparison of industrial performance outcomes over the period in which LCRs were eliminated and between the groups affected by the prohibition of LCRs in different ways (i.e. based on whether or not the policies were previously in force). This chapter provides much greater detail about the specification of the model, including the operationalisation of the key variables, in a more formal econometric setting. The chapter proceeds as follows. In section 5.2, I recap the logic of the DID model using panel data, and explain the specification of 'fixed effects' in order to account for time-invariant heterogeneity and global factors affecting performance outcomes. I also attend to my strategy for estimating robust standard errors in order to maximise the validity of my empirical results. In section 5.3, I provide a discussion of how the model's result may be interpreted, and discuss the assumptions behind the interpretations, and point to potential limitations. In section 5.4, I describe the operationalisation of the variables used in the model. The construction of the post-treatment dummy variables is described, before turning to the operationalisation of industrial performance indicators, and then to other covariates incorporated into the models. The section concludes with a short discussion of the data of which tables are provided in the appendices

5.2 MODEL SPECIFICATION

5.2.1 Impact evaluation in the presence of heterogeneity and selection bias

As discussed in the previous chapter, quantitative impact evaluations are concerned with deriving causal inferences from associations between the independent variable – the policy 'treatment', indicated by the presence of a dummy variable – and the dependent variable industrial performance. In the context of an experimental research, randomisation of the treatment allocation ensures that there are no systematic differences between the treated and control groups with respect to other variables; "probability of assignment to treatment does not vary with potential outcomes" (Imbens and Wooldridge, 2009: 7). In such a situation, we can simply compare the two groups after the treatment to estimate the policy impact. Obviously, LCRs were not randomly allocated and the population of cases (countries in the world) is characterised by a high degree of heterogeneity between cases. In the next sections I discuss the implications of country heterogeneity generally, and non-random allocation of treatment, known as selection bias, more specifically. The problem in both cases is seen to be one of unobserved variables.

5.2.1.1 Heterogeneity

We first consider a basic regression model for panel data:

$$Y_{it} = \alpha + \beta' X_{it} + u_{it}$$

Where Y_{it} represents values of a continuous dependent variable Y for individual i in time period t, from $i = 1$ to $i = N$ cross-sectional units and from $t = 1$ to $i = T$ time periods; α represents a common constant (intercept); the vector X'_{it} represents the it^{th} observation on k exogenous explanatory variables; and u_{it} is the idiosyncratic error term, containing the impacts of any omitted explanatory variables plus 'white noise'.

Following Hsiao (2007), we may distinguish between observed and unobserved explanatory variables with $\beta' X_{it}$ and $\rho' Z_{it}$, where X_{it} represents $k_1 \times 1$ vectors of observed and

Z_{it} represents $k_2 \times 1$ vectors of unobserved explanatory variables respectively, and β and ρ are $k_1 \times 1$ and $k_2 \times 1$ vectors of constants.

$$Y_{it} = \alpha + \beta' X_{it} + \rho' Z_{it} + u_{it}$$

Obviously, observed explanatory variables are simply introduced into the model as covariates. However, in the presence of unobserved heterogeneity among the cross-sectional units, the parameters α and β are likely to be estimated inconsistently. Heterogeneity may be exhibited in the intercept or both intercept and slope. Even if only the intercepts are heterogeneous, bias in the slope coefficient β will arise (Hsiao 2007: 9).

5.2.1.2 Selection bias

An important manifestation of heterogeneity in the context of impact evaluation is selection bias in the allocation of treatment. Impact evaluation involves comparing treatment and control groups that are as similar as possible in every respect except the presence or absence of treatment, as well as observed factors that can be controlled for statistically. However, this is very difficult to achieve. Countries that implemented LCRs are likely to be systematically different from those which did not, as a result of both observed and unobserved factors.

This problem is called selection bias, and relates to the endogenous nature of the decision to implement LCRs and in relation to the outcome variable, industrial performance. Endogeneity is the correlation of regressors with error disturbances, which essentially occurs when variables are jointly determined within a system. This deviates from the assumption of strict exogeneity which holds that regressors are independent (uncorrelated) with respect to the error u_{it}.

As noted by Baltagi (2008), endogeneity of regressors is a serious problem in econometrics. Consider the simple model $Y = X + u$. In order to establish the presence of a causal (as opposed to statistical) relationship running from X to Y, we are assuming that X and u cause Y; that X and u are independent of one another; and that Y does not cause X.

If covariate X is jointly determined by an unobserved process Z that also determines u, the estimated coefficient on X will be biased because it will combine the direct (via X) and indirect (via Z and relegated to the error u) effects; we cannot know how much of the impact is really due to X and which to the unobserved 'confounder', Z.

Therefore, selection bias occurs when the allocation of the treatment (policy) is determined by processes Z that also influence Y – or by Y itself. Turning to a concrete example, countries that implement LCRs might do so deliberately as a response to (unobserved) market failures, suggesting that industrial performance is systematically lower among such countries. In such a case, the estimated association between the policy and industrial performance would be biased downwards. The observed policy variable X may have a positive impact that is cancelled out by the unobserved Z to produce a negative estimate of β when the true β is positive. Alternatively, states might be more likely to implement LCRs if policy-makers believe the prospects for industrial growth are strong, and/or if the state has the capacity and desire to practice interventionist industrial policy (i.e. is a 'development state') – both of which positively influence the impacts arising from the implementation of LCRs. Without reliable indicators of 'market prospects' or 'capacity to practice industrial policy', the implication is that endogeneity would bias the association between LCRs and performance in the opposite direction, leading to an *inflated* estimate of β.

One approach to eliminate endogeneity bias is to introduce variables that are correlated with X but which could not plausibly influence Y, known as 'instrumental variables' (for example, see Khandker et al., 2010: chapter 6). Unfortunately, valid instruments for the implementation of LCRs that are unrelated to industrial performance are impossible to find, a practical difficulty that is common in econometric work aimed at evaluating policy interventions, as discussed by Rodrik (2007: 20).

Selection bias is one manifestation of endogeneity involving the policy treatment variable. The possibility that covariates other that the policy variable are jointly determined within the system, and the implications, are considered below.

5.2.2 Differences-in-differences and individual (fixed) effects

Provided data on the factors affecting outcomes are available to introduce as statistical controls, endogeneity is not a problem. However, if the relevant factors are unobserved, estimates on the policy treatment will be biased, for the reasons discussed above.

Difference-in-difference (hereafter, DID) approaches provide a potential solution to this problem. Following Petersen (2004), we may distinguish between explanatory variables that vary over time, such as income, and those which are constant, such as geographical location or colonial heritage. Provided that unobserved differences between groups are time-invariant, it is possible to estimate treatment effects net of initial differences, thus estimating the treatment effect as the difference (or change over time) in the difference between the treatment and control groups (thus, difference-in-difference).

Thus, if selection bias is present, but the characteristics upon which selection is based are time-invariant with respect to their influence on performance outcomes, the DID design completely removes the bias. DID can be applied provided there are two comparator groups in two time periods, but are also applicable to panel data models. Following Khandker et al. (2010), the fixed effects panel data model generalises the two-period DID model. As the authors observe, this generalisation "is particularly important for a model that controls not only for the unobserved time-invariant heterogeneity but also for heterogeneity in observed characteristics over a multiple-period setting" (p. 74).

If unobserved variables are constant over time for a given cross-sectional unit, or constant across units for a given time period, we are able to expand the disturbance term, u_{it}, as follows:

$$u_{it} = \mu_i + \gamma_t + v_{it}$$

where μ_i denotes unobservable, time-invariant individual-specific effects, γ_t denotes time-specific effects that are common to all cross-sectional units, and v_{it} denotes the remaining error (Baltagi 2008).

To continue, μ_i and γ_t can be estimated as parameters in panel models by including dummy variables for each cross-sectional unit or time period, respectively, to give us the two way[54] fixed effects model:

$$Y_{it} = \alpha + \beta' X_{it} + \mu_i + \gamma_t + v_{it}$$

This model "is robust to some forms of endogeneity arising from unobservable group-specific heterogeneity" (Mora and Reggio, 2010). Specifically, fixed effects models permit the country-specific, time-invariant element of the error term μ_i to be correlated with covariates X_{it}. This 'weak' exogeneity may be contrasted with a stricter form demanded by the alternative 'random effects' model. Considering individual country effects as random, normally distributed attributes, random effects models relegate individual effects to a component of the error term. As a result, random effects models are more efficient provided that X_{it} is independent of μ_i, as they require fewer parameters to be estimated; fixed effects are more appropriate if these assumptions don't

[54] 'Two way' refers the inclusion of time and cross-sectional fixed effects, as opposed to models which incorporate cross-sectional effects only.

hold, as random effects become inconsistent. Application of the Hausman test[55] show that fixed effects models are preferred for the models operationalised below.

To complete the model, treatment effects are estimated by introducing a dummy variable for the post-treatment time period for treatment and control groups, $D_{it}^{Post\_all}$; another for the treatment group across both time periods, $D_{it}^{Treatment}$, and an interaction between the two, $D_{it}^{Post\_treated}$, signifying the post-treatment effect on the treated. The symbols δ and φ are used here to denote the coefficients associated with the two post-treatment dummy variables. $D_{it}^{Treatment}$ is not estimated in the fixed effects model as it is collinear with the unobservable, time-invariant individual-specific effects μ_i.

The complete model, therefore, which I operationalise below, is as follows:

$$Y_{it} = \alpha + \beta' X_{it} + \mu_i + \gamma_t + \delta D_{it}^{Post\_all} + \varphi D_{it}^{Post\_treated} + v_{it}$$

Before turning to a broader discussion of the interpretation, assumptions and limitations of the fixed effect DID model, and the implications for my own research design and analysis, we first provide a short discussion of statistical inference and the estimation of standard errors.

5.2.3 Statistical inference in the presence of non-stationarity and non-IID errors

The process of estimating the parameters of a population from a sample is called statistical inference. Coefficients indicate the relationship between dependent and independent variables, and are estimated with varying degrees of certainty or precision which are denoted by the sample standard errors, t-statistics and p-values. These latter values convey the probability that the estimated coefficients would be observed, within the sample, if the estimated statistical relationship were in fact false, within the population.

5.2.3.1 Autoregressive processes and non-stationarity in time-series data

Like all analysis based on data with time-series components, the analysis of panel data such as described here is subject to potential complications arising from non-stationarity, particularly in the presence of unit roots. Time-series variables are stationary if they include a well-defined mean around which values fluctuate with constant, finite variance. Obviously, these conditions are unlikely to pertain to many time-series of 'real' economic variables. More commonly, variables will exhibit 'trend-stationarity', when removal of deterministic components of the variable such as a linear time trend reveals a stationary series. Stationary and trend-stationary series are 'mean-reverting'; shocks to the process are transitory and their influence dies out as they move further into the past.

More concerning from an econometric perspective are series that are characterised by a 'random walk' in which the effects of shocks in the process are permanent. Essentially, the presence of a unit root implies that the mean and variance of a time-series depends on the time period in which such values are measures.

For illustration, consider an autoregressive process in which lagged values of the dependent variable Y_{t-1} exert influence on current values Y_t . Both stationary and trend-stationary pertain to situations in which the 'characteristic polynomial' of an autoregressive (AR(1)) process exceeds unity. Such time-series may be described as being integrated of order zero, I(0), denoting that they do not need to be differenced in order to exhibit stationarity.

However, series in which the characteristic polynomial equals unity – i.e. those which contain a unit root[56] – are by definition non-stationary but may be made stationary through a process of

[55] The null hypothesis is that the unique errors are uncorrelated with regressors, in which case the random effects model is preferred. See Hsiao, 2007: 50-51.

differencing. Such series are described as difference-stationary and integrated of order one (I(1)) if they require differencing once in order to induce stationarity.

The distinction between trend- and difference-stationarity has important analytical implications, since the presence of unit roots can lead to spurious regression results in time-series analysis (Banerjee, 1999).

There are a number of panel unit root tests, which extend standard tests for unit roots within individual time-series to multiple cross-sectional units (e.g. Hadri, 2000; Choi, 2001; Levin et al., 2002; Im et al., 2003). This extension involves a number of complications, including the interpretation of the results in the event the null hypothesis is rejected, since the alternative can be a single common stationary root, heterogeneous stationary roots, or simply indicate that not all the panels contain unit roots (Breitung and Pesaran, 2005). Furthermore, it is rather difficult with time series of limited length (such as in the present analysis) to distinguish a permanent response to a shock implied by a unit root and a temporary response with a very high autoregressive coefficient. As Hall and Mairesse (2002: 452) observe,

> it seems fairly intuitive that, within the general class of models where heterogeneity is restricted to an individual fixed effect, the times series behaviour of an individual variable should often be well approximated either as an autoregressive process with a small positive coefficient and large fixed effects or as an autoregressive process with a near-unit root and negligible individual fixed effects.

Thus, as Smith (2001: 5) notes, "all these tests have very low power (i.e. a low probability of rejecting the I(1), unit root, null) when in fact the process is stationary with a coefficient close to unity".

Most of the available tests for unit roots in panel data are only available for balanced panels without gaps in the data. The exceptions are variants of Fisher-type tests which conduct unit-root tests for each panel individually, and then combine the p-values from these tests to produce an overall test (Choi, 2001). Tests can accommodate panel-specific means (individual fixed effects) and time trends in the model of the data-generating process.

Applying this approach using augmented Dickey-Fuller tests (Dickey and Fuller, 1979), notwithstanding the low power of the tests, it is clear that the standard log-transformed variables may be non-stationary (I(1)): the null hypothesis that all panels contain unit roots cannot be rejected, as shown in appendix 28. However, when a linear time trend is incorporated into the tests, the null hypothesis is rejected in most cases. Given the low power of the tests, as described above, I conclude that the relevant variables are trend-stationary, and that the incorporation of two way fixed effects – i.e. including the incorporation of year-specific dummy variables, which is more flexible than the incorporation of a linear time trend – sufficiently acknowledges the time-series characteristics of the dataset and the potential presence of unit roots for the purposes of this analysis.

5.2.3.2 Non-IID errors and robust estimation

As Cameron and Miller (2013) observe, much attention is paid in applied empirical work to obtaining unbiased coefficients, while less attention is paid to accurate statistical inference. In order to draw correct inferences from fixed effects models, the errors (denoted v_{it}) that cannot be estimated as country- or time-period specific intercepts are usually assumed to be random and have identical probability distributions (i.e. 'independent and identically distributed', or IID). This is clearly violated in cases where errors are 'clustered' within specific cross-sectional units over

[56] If the characteristic polynomial is less than unity, the series rapidly diverges towards + or - infinity. This behaviour is termed explosive and appears counter-intuitive to almost all real life situations; we assume for the present discussion that all roots are either equal to or exceed unity.

time (serial correlation) or within temporal units across panels (cross-sectional dependence, or CSD). A third violation occurs when errors vary with X_{it} – that is, are heteroskedastic. Failure to control for non-IID errors can lead to

> very misleadingly small standard errors, and consequent misleadingly narrow confidence intervals, large t-statistics and low p-values. It is not unusual to have applications where standard errors that control for within-cluster correlation are several times larger than default standard errors that ignore such correlation (Cameron and Miller, 2013: 4).

That errors are likely to be clustered within cross-sectional units is one of the basic motivations for fixed effects panel models. Serial correlation of the error terms can arise if outcomes are affected directly by past values in the presence of an autoregressive process (called 'true state dependence') or it can occur due to the correlation of unobserved variables with the cross-sectional units. Thus, while the incorporation of country intercepts (fixed effects) takes care of time-invariant clustering "they will not completely control for within-cluster error correlation... due to omitted factors that evolve progressively over time" (Cameron and Miller, 2013: 16-17). Drukker (2003) develops a test for serial correlation, which is (predictably) present in most of my model specifications, as reported in section 5.5. Fortunately, in short panel cases such as the present study, where the number of cross-sectional units is large relative to the number of time periods, Cameron and Trivedi (2010: 273) consider that it is sufficient to simply "obtain standard errors that control for serial correlation in the error term without explicitly stating a model for serial correlation", which is the approach employed here[57].

As with serial correlation, simple forms of CSD – an unobserved effect common to all countries – can be sufficiently addressed by the incorporation of fixed effects (year dummies), which is my approach. The test to establish the presence of CSD, which follows Sarafidis and De Hoyos (2006), has been carried out where data allow. Although CSD is absent in my models, I repeated my analyses using Driscoll and Kraay's (1998) procedure for estimating CSD robust standard errors in fixed effects models. Because the coefficients are identical to the main specifications, with invariably smaller standard errors, I do not report the findings here. However, I also run additional specifications which allow for any unobserved region-specific year effects, for example relating to business cycle shocks and other demand-side factors that occur at the regional level. This additional specification guards against the possibility that the estimations are picking up regional trends common to the treatment group, which are mainly geographically concentrated in Asia. The addition of region-specific year effects does not significantly affect the overall findings relating to the impact of the elimination of LCRs.

[57] It should be noted here that there are a number of alternative approaches to the presence of serial correlation, some of which require more stringent assumptions about the causes of serial correlation. These approaches give rise to point estimates that are more efficient under certain circumstances but may also be biased. For example, feasible generalised least squares may be employed to account for serial correlation (and heteroskedasticity), but is inefficient in the presence of fixed effects, which – as noted above – characterise my models as identified through the use of the Hausman test. It is possible to incorporate autoregressive processes into the fixed effects model (following Bhargava et al., 1982 and Baltagi and Wu, 1999); however, as discussed in Cameron and Trivedi (2010), the resulting model is more appropriate for long panels. Finally, where serial correlation of errors arises from true state dependence lags of the dependent variable should be incorporated as regressors, under which the fixed effects estimator becomes inconsistent (Cameron and Trivedi, 2010: 293). In this instance, it may be necessary to consider dynamic models which incorporate lags such as developed by Arellano and Bond (1991). However, the estimation strategy is complex and requires the satisfaction of stringent assumptions such as there be no autocorrelation in the idiosyncratic errors (other than those arising from the lagged dependent variable); for these reasons, such models are disregarded.

Finally, Greene (2000) develops a test which shows that heteroskedasticity is present in my models, as reported in section 5.5. Cluster robust standard error estimation controls for heteroskedasticity as well as serial correlation, so the presence of heteroscedasticity does not necessitate any further consideration.

5.3 INTERPRETATION, ASSUMPTIONS AND LIMITATIONS OF DID / FIXED EFFECTS APPROACH

To recap, DID estimators rely on the (implicit) comparison of "four different groups of objects" (Lechner, 2011): treatment and control groups, measured before and after the treatment. In the fixed effects panel model here, in which time-invariant variables (such as treatment and control group dummy variables) are collinear with the country fixed effects (as discussed above), we are essentially concerned with the coefficients for two dummy variables: a post-treatment dummy that applies to both treatment and control groups alike ($D_{it}^{Period\ 2}$); and one that is specific to the treatment group (D_{it}^{Post}).

Clearly, a statistical relationship does not necessarily indicate a causal one – 'correlation is not causation', after all. However, one of the goals of the present research is precisely to generate causal inferences about the impacts of the elimination of LCRs. The estimated coefficient for $D_{it}^{Post\_treated}$, φ is the main parameter of interest: the DID estimator, which conveys what is termed the 'average treatment effect' (ATE) within the impact evaluation literature (Khandker et al., 2010: 26). The ATE corresponds to the observed difference between the treatment and control groups with respect to changes in post-treatment outcomes. Thus, under certain stringent assumptions, the DID estimator "will indeed identify a mean causal effect" (Lechner, 2011). These include that treatments are completed represented; that there are no treatment spillovers (or 'interactions') between members of the population; that treatment does not influence treated members in the pre-treatment period; and that treatment and control groups are subject to common trends in the absence of treatment, except to the extent that heterogeneity between groups is captured by the inclusion of exogenous explanatory variables.

If these assumptions hold, the DID estimator should identify an effect that would pertain to the whole population in the counterfactual scenario that the latter were also subject to treatment. Thus, to the extent that $\varphi D_{it}^{Post\_treated}$ is statistically significant, we can be confident that there are causal effects associated with treatment.

However, in the present case, the interpretation of the coefficients for $D_{it}^{Post\_all}$ and $D_{it}^{Post\_treated}$ is complicated by several main factors, relating to the basis of statistical inference with respect to sampling and population considerations, the presence of 'spillover' or general equilibrium effects of the treatment on the control group, and the validity of the parallel paths assumption.

5.3.1 Statistical inference within a finite population

The "textbook" approach to inference relies on the assumption that "the observed units are a random sample from a large population" (Abadie et al., 2014) which gives rise to sampling variation and uncertainty. For example, Imbens and Wooldridge (2009: 11) distinguish different types of average treatment effect, depending on whether we are concerned with extrapolating inferences to a wider population or simply with making inferences "conditional on the covariates in the sample". This raises questions about the role of statistical inference when analysis includes an entire population (or close to it) such as all countries in the world.

One interpretation is that we are interested in making inferences about an infinite hypothetical population such that we can still consider our 'population' as a sample thereof; although such an

interpretation has been criticised by scholars such as Frick (1998) as inconsistent with discussions of inference in many cases of applied research. Others emphasise uncertainty in the presence of measurement error, incomplete data, or the impact of unobserved random variation on outcomes of interest, in order to justify the use of inference across whole populations. This latter view is summarised by Abadie et al. (2014: 2) who make the case that

> statistics is fundamentally about drawing inferences with incomplete data. If the researcher sees all relevant data, there is no need for inference, since any question can be answered by simply doing calculations on the data. Outside of this polar case, it is important to be precise in what sense the data are incomplete. Often we can consider a population of units and *a set of possible states of the world* [my italics]. There is a set of variables that takes on different values for each unit depending on the state of the world.

Thus, when addressing questions regarding the average causal effect of treatment on a population, the appropriate comparison is between outcomes for the whole population under counterfactual situations *which we can never observe* – one in which they were treated and another in the absence of treatment. Causal effects are estimated with uncertainty because "by definition we observe each physical unit at most once, either in the state where it is treated or the state where it is not, with the value of the outcome in the other state missing" (ibid.). The authors distinguish causal and descriptive estimands, where the latter may be measured with certainty in relation to questions such as whether there are significant differences "between the average outcome for countries with one set of institutions and the average outcome for countries with a different set of institutions".

Under alternative assumptions about the population and the nature of selection into the LCR treatment group, estimates for the coefficients $D_{it}^{Post\_treated}$ and $D_{it}^{Post\_all}$ could be interpreted as descriptive estimands and measured without error. For example, following Ragin (2005), we might apply 'scoping conditions' such that the treatment and control groups comprise distinct sub-populations, in which LCRs or lack thereof could be considered as attributes; and the coefficients on $D_{it}^{Post\_treated}$ and $D_{it}^{Post\_all}$ simply describe the difference in mean performance outcomes for each group. Under such an interpretation, coefficients may be meaningful even if they are not statistically significant, and even if – given the stringent assumptions required to enable causal inference – we cannot confidently say that they represent average treatment effects that can be generalised to the wider global population.

5.3.2 Spillover and general equilibrium effects

The second assumption required in order to draw causal inferences from the DID design is that, in the manner of an experimental research design, only one of the groups is actually affected by the policy reform 'treatment' the effects of which are being estimated. In actuality, this assumption is not in accordance with our theoretical expectations about the causal effects of policy space restrictions, which may also affect industrial performance outcomes in countries in which LCRs were not in force: both the treatment and control groups face a more liberal external environment for their exports, due to the elimination of LCRs in other countries. Because of the operation of causal mechanisms within an interdependent system, in which global firms are able to serve markets through investment and trade, policy changes in one location can easily affect performance outcomes in another; there is no basis for the assumption that liberalisation will only affect the liberalising countries themselves. On one hand, it could lead to enhanced investment, output and exports if assemblers in liberalising countries substitute local parts and

components for those from abroad. On the other, it might divert investment towards the liberalising economies, thus reducing output and exports elsewhere.

There is no way to determine the direction or magnitude of these impacts *a priori.* As a result, the coefficient for the control group $D_{it}^{Post\_all}$ may be of interest as well as $D_{it}^{Post\_treated}$. However, since the increase in market access is common to both groups, it is reasonable to expect that any global effects applying across the treatment and control groups are captured by the incorporation of year-specific effects γ_t while $D_{it}^{Post\_treated}$ relates to the impact of internal liberalisation on performance outcomes. Increased market access is likely to take effect gradually as individual countries liberalise their local content regimes.

5.3.3 Parallel paths and time-varying heterogeneity

As should be clear from the preceding discussion, the key assumption of our methodological approach is that the differences between treatment and control groups with respect to the dependent variable would remain constant in the absence of treatment: what Mora and Reggio (2012) call the 'parallel paths' assumption. In the presence of unobserved time-varying heterogeneity associated with selection into the treatment group, the parallel paths assumption is violated.

In evaluating the impact of the *elimination* of LCRs, we know already that there is a significant difference between the groups with respect to initial pre-treatment conditions – the implementation of LCRs in the pre-treatment period. The impacts of selection bias described above are therefore manifested in the pre-treatment period, making it more difficult to ascribe changes in performance to the treatment effect. This deviation can only be justified under the assumption that selection bias reflects time-invariant heterogeneity. If as a result of their alternative policy regimes the treatment and control groups were already following divergent (non-parallel) paths at the time of liberalisation, estimates of the direction and magnitude of treatment effects may be biased. Similarly, if there are other unobserved factors that are correlated with the implementation of LCRs and that affect industrial performance outcomes – for example, that the liberalising countries appeared poised to experience rapid growth, and that they featured heavily in the strategic decisions of the global automakers for this reason, as seems likely to have been the case – the DID estimator will be biased.

In the models below, I introduce fixed year effects to account for common or global influences on performance outcomes, and I introduce covariates to estimate the influence of observable time-varying characteristics. Put another way, the crucial assumption of the following analysis is that the impacts of the systematic diversity of policy and institutional regimes across treatment and control groups is adequately captured by the inclusion of μ_i and time-varying control variables $\beta' X_{it}$ (the operationalisation of which is discussed in the following chapter) such that $\varphi D_{it}^{Post\_treated}$ is an unbiased estimator of the impact of the policy change. Pre-liberalisation performance outcomes may vary between groups but are assumed to be stable in the absence of market growth, industrial capability development, and the policy and institutional variables operationalised below.

5.4 DATA AND MODEL CONSTRUCTION

5.4.1 Construction of the post-treatment dummy variables

The underlying logic behind the D-in-D model is that comparisons are being made based on the temporal equivalence of each post-treatment dummy. Since the conditions of the natural experiment exploited here deviates from an experimental situation in which 'treatments' are implemented simultaneously – thus ensuring that $D_{it}^{Post\_all}$ and $D_{it}^{Post\_treated}$ relate to

contemporaneous periods – particular attention must be paid to ensuring that $D_{it}^{Post\_all}$ and $D_{it}^{Post\_treated}$ are appropriate comparators.

The treatment group comprises the 16 countries identified in section 3.5.4 as having implemented LCRs in the post-WTO period. For these countries, $D_{it}^{Post\_treated} = 1$ from the first full year in which LCRs were no longer in force, as illustrated in columns (3) and (4) of table 5-1, below. As shown, the years in which LCRs were eliminated in the treatment group range from 1996 to 2007. The temporal 'mid-point' for the elimination of LCRs, as indicated by the cumulative percentage of countries that have eliminated LCRs by each year, is 2002. Thus, for the treatment group $D_{it}^{Post\_all} = D_{it}^{Post\_treated}$ and for the control group, $D_{it}^{Period\ 2}$ = 1 if $t \geq 2002$, as illustrated in column (5) of table 5-1. This approach ensures that there are an almost equal number of data points in which $D_{it}^{Post\_treated} = 1$ between 1995 and 2001 (14) as there are data points in which $D_{it}^{Post\_treated} = 0$ between 2003 and 2011 (13). As a result, although $D_{it}^{Post\_all}$ and $D_{it}^{Post\_treated}$ do not pertain to precisely contemporaneous time periods, any bias arising from this is likely to be very minimal.

Table 5-1: Illustration of construction of post-treatment dummy variables

Year	(1) Cumulative frequency of countries that have eliminated LCRs	(2) Cumulative percentage of countries which have eliminated LCRs	(3) Example $D_{it}^{Post\_treated}$ (Chile)	(4) Example $D_{it}^{Post\_treated}$ (Philippines)	(5) Example $D_{it}^{Post\_all}$ (control group)
1995	0	0	0	0	0
1996	1	6.25	0	0	0
1997	1	6.25	0	0	0
1998	1	6.25	0	0	0
1999	2	12.5	1	0	0
2000	3	18.75	1	0	0
2001	6	37.5	1	0	0
2002	8	50	1	0	1
2003	10	62.5	1	0	1
2004	13	81.25	1	0	1
2005	14	87.5	1	1	1
2006	14	87.5	1	1	1
2007	16	100	1	1	1
2008	16	100	1	1	1
2009	16	100	1	1	1
2010	16	100	1	1	1
2011	16	100	1	1	1

5.4.2 Operationalising industrial performance in the automotive parts and components sector

As previously discussed, the elimination of LCRs may have impacts on quantitative indicators of production, trade and investment at the national level; my goal is to ascertain the nature of these impacts. Following Doner et al. (2006b: 6-7), I acknowledge that "comparing auto parts industries is complicated by national differences in definition and coverage" and "provide an overview of standardized data" on performance outcomes, which are required for large-n variable-oriented analysis, as discussed in chapter 4.

To recap, LCRs are intended to stimulate technological upgrading and technology transfer, the ultimate goal of which is to increase productivity within the intermediate sector[58]. Following Yusuf et al. (2009), 'dimensions' of upgrading that may be measured for international comparison include increases in (a) exports, (b) local content, and (c) value-added, where

(a) exports are a common proxy for competitiveness, since they require that producers are able to achieve levels of productive efficiency, quality and cost demanded on the world market, ceteris paribus;
(b) local content at the national level measures intermediate output that is used or sold within the national economy. It is determined by subtracting imports from consumption of parts and components or (equivalently) by subtracting exports from output. Ceteris paribus, high levels of local content indicate that local producers are competitive in the presence of import competition; and
(c) value-added is the proportion of output that is contributed by returns to labour and capital, and is closely associated with productivity.

In addition, Doner et al. (2004) discuss the value of (d) trade balance as an indicator of industrial performance, where

(d) trade balance relates to both (a) and (b) above, requires we also take into consideration combined changes in import and export propensity. Other things being equal, upgrading requires growth in exports and local production relative to imports.

Another potential effect of LCRs relates to investment flows. Internationally-comparable data on FDI at the level of disaggregation required for this analysis are not available, although there are some limited data on gross fixed capital formation (GFCF), as described below. (FDI indicators feature in the following chapter, employing national and secondary sources of data for individual countries.)

[58] It should be noted at this stage that all of the performance measures employed in this thesis – that is, measures of parts and components sector performance – are limited as indicators of the effectiveness of automotive industrial policies and the performance of the automotive sector more broadly. Indeed, positive performance outcomes as reflected by the indicators employed here may coincide with negative performance outcomes for the vehicle assembly sector, and the failure of policies aimed at promoting the latter. Thus, the following analysis proceeds under that caveat that the choice of indicator reflects an implicit assumption that automotive policies are designed to enhance parts and components sector performance, such that if such an outcome is observed, policies are deemed to have been effective. However, it is clear that such an assumption is an oversimplification in practice. For example, the case of the Philippines is instructive. Despite exhibiting extremely rapid and sustained growth in output and exports of parts and components, the assembly sector has performed badly, with demand served mainly through imports (UNCTAD, 2007). Thus, the Philippines have failed to establish a highly integrated automotive sector – integration being one of the characteristics which LCRs are designed to promote and which strong parts and components sector performance is supposed to reflect. A further limitation, again illustrated by the case of the Philippines, is that strong trade performance can mask substantial weaknesses in terms of indigenous technological capabilities if parts suppliers are engaged in labour-intensive 'enclave' production for global firms. In the case of the Philippines, as UNCTAD (2007: 104) note, "the few successful parts manufacturers are the selected in-house manufacturers of Japanese auto TNCs (based on their global and regional plans), and the global parts exporters, which are not necessarily tied to the local car assembly industry". Indeed, as Aldaba (2007) finds, the imported content of exports from these enclaves remains very high, while local firms are significantly less competitive than the subsidiaries of their multinational counterparts. Strong trade performance, as measured by the indicators employed in the present analysis, tends to mask a more nuanced understanding of these complex phenomena.

Before proceeding to specify the indicators used in this analysis, we discuss the availability of data at the requisite level of disaggregation (to permit examination of outcomes in the intermediate sector at which LCRs have been targeted), and comprehensive coverage (to permit international comparison of outcomes across a sample large enough to permit statistical analysis).

5.4.2.1 Production data

Production data are classified in the International Standard Industrial Classification (ISIC) scheme. The ISIC is based on classification of the activity, as opposed to the product, *per se*. The scheme differentiates between manufacture of motor vehicles (ISIC 341), manufacture of bodies (coachwork) for motor vehicles (ISIC 342), and manufacture of parts and accessories for motor vehicles and their engines (ISIC 343). Output data at the appropriate level of disaggregation are only available from 1995, and although data are not comprehensively available cross-nationally or inter-temporally, they cover a sufficiently large number of countries and years to permit statistical analysis with approximately 4-700 observations, depending on the indicator. Data are available from the UNIDO *Industrial Supply and Demand* and *Industrial Statistics* databases for apparent consumption, GFCF, output, and value-added (UNIDO, 2011b); as discussed above, these data permit the construction of an indicator of local content. Data for output, GFCF and value-added are highly correlated and give rise to highly similar estimation results, so I omit the latter two indicators from the present analysis; estimation results are reported in appendix 6.

5.4.2.2 Trade data

Trade flows are classified in two main schemes: the Harmonised System (HS) and the Standard International Trade Classification (SITC). Both offer the potential to distinguish trade in vehicles from trade in parts and components, and for the purposes of the current analysis, I use the SITC nomenclature. The SITC differentiates between vehicles (SITC 781-3), and other parts and components (SITC 784) including chassis (SITC 7841) and bodies (SITC 7842). These data are available from the World Integrated Trade Solution (WITS, 2015), from 1988, but are only comprehensively available, across the majority of countries, from 1995.

5.4.3 The construction of performance indicators

There are numerous ways in which to operationalise industrial performance, depending on the purpose of the indicator. One of the first issues concerns whether any change in industrial performance is better measured by change in the absolute level of performance indicators or by their growth rates over time. Levels and growth rates of variables both contribute insights into performance. However, given the characteristics of the fixed effect DID approach discussed above, it is appropriate to measure industrial performance as change in levels[59]: the shift associated with $D_{it}^{Post\_treatment}$.

5.4.3.1 Transformations to reduce skewness

Absolute levels are problematic for several reasons. Given country heterogeneity, absolute performance outcomes span an enormous range of values and the data are extremely skewed. It should also be noted that where data are reported in current USD, I have converted into constant USD by deflating the current value by the US price level index, following World Bank (2011) methodological guidance. This reduces skewness due to the compound impact of price inflation and enables meaningful comparisons of values across time. Nevertheless, constant dollar values

[59] An alternative to the fixed effects model with similar properties is the first difference estimator. This model regresses differenced values in order to remove time-invariant unobserved effects. However, this approach is less suitable when there are significant numbers of missing data points. See Angrist and Pischke (2008).

are still highly skewed across the panel. Taking the natural log of the data reduce this skewness considerably, and improve the fit of the model in most instances (Wooldridge, 2012). Log transformations also simplify the interpretation of the coefficients, as discussed in the findings section below. Log transformations are standard practice in most applied macroeconometric panel research, e.g. Santos-Paulino and Thirwall (2002).

The indicators of parts and components performance derived so far are:

I. Log parts and components local content, constant 1995 USD (ISIC 343);
II. Log parts and component output, constant 1995 USD (ISIC 343);
III. Log parts and components exports, constant 1995 USD (SITC 784); and
IV. Log parts and components imports, constant 1995 USD (SITC 784).

5.4.3.2 Ratio indicators

It is also common practice in the literature to express industrial performance indicators as ratios of other values, for example the size of the automotive sector, GDP, or total trade. For example, local content can be expressed as a proportion of total intermediate consumption, or of total vehicle production, in order to enable comparison between countries of different sizes. More generally, country j's output (Y), exports (E) and imports (M) for a given sector i can be expressed as a proportion of the total for all sectors within the country, or as a proportion of the global total for the sector.

In the first instance, we have an indicator of the importance of the sector relative to all activity in the country itself which can be denoted as:

$$\frac{y_i^j}{\sum_i y_i^j}$$

and is equivalent to parts and components sector output as a proportion of GDP. Following Overman, et al. (2001), this can be normalised by the global share of sector i in global economic activity, denoted thus:

$$\frac{\frac{y_i^j}{\sum_i y_i^j}}{\frac{\sum_j y_i^j}{\sum_j \sum_{ji} y_i^j}}$$

This 'specialisation index' is conceptually equivalent to the concept of 'revealed comparative advantage' (RCA) with respect to exports. Such measures take into account that countries have widely varying productivity levels by comparing sectoral performance in relation to their own economy; by construction, all countries specialise or exhibit a revealed comparative advantage in at least one industrial sector relative to other sectors. If one of these indices exceed unity, a country specialises in production or exhibits a comparative advantage in a given sector.

In the second instance, we have an indicator of the magnitude of a country's sectoral performance measure relative to the magnitude of the sector globally, which can be denoted – in the case of output – as

$$\frac{y_i^j}{\sum_j y_i^j}$$

and is equivalent to Narula and Wakelin's (1998) conceptualisation of 'absolute advantage' which they employ as a proxy for competitiveness. This measure gives weight to larger and more

economically productive countries, and is useful for comparing the absolute magnitude of performance indicators in relation to other countries and across time.

As Wooldridge (2012) notes, although both level and log forms are appropriate for variables measured as proportions or percentages. I have followed this tendency for the ratio variables described above as they are still highly skewed and due to the considerably improved fit of model specifications incorporating log variables. Thus, I derive the following ratio indicators:

V. Log local content as a proportion of apparent consumption (ISIC 343);
VI. Log output specialisation index (ISIC 343);
VII. Log export specialisation / RCA index (SITC 784); and
VIII. Log imports as a proportion of GDP (SITC 784).

5.4.3.3 Trade balance

The single exception to my use of log transformations relates to the indicator of trade balance. There are two distinct ways in which the concept of trade balance can be operationalised in empirical research. One is simply net exports (gross exports minus gross imports) for a given sector (or more commonly in applied research, for all traded goods). Net exports can obviously take a negative value. Since it is not possible to log transform negative values, this approach has not been possible for the trade balance variable. Hence, in order to facilitate the comparison of coefficients for countries of diverse size, I take net exports (exports minus imports) as a percentage of GDP.

The second way in which trade balance may be operationalised relates to the ratio rather than the literal balance of exports and imports. This is important because it is plausible that the ratio of exports to imports might grow at the same time as a deterioration in net exports (or vice versa). For example, consider the scenario of a country which exports £1 million and imports £10 million. The country's net exports stand at -£9 million and the ratio of exports to imports is 0.1: 1. Now assume that exports increase by 200% while imports increase by 50%: net exports deteriorate (to -£13 million) while the ratio of exports to imports improves (to 0.13: 1). There is no clear rationale for prioritising one indicator of the change in exports relative to imports over the other, so I include both.

Upon inspection, the indicator *exports: imports* follows an extremely skewed distribution that encompasses a very large range of values, ranging from .0000429 to 186. It is also difficult to interpret. Consider the scenario of a country with exports of £10 million and imports of £10 million: a ratio of 1: 1. If exports increase 10-fold, the ratio rises to 10: 1 (+9). If imports rise 10-fold instead, the ratio falls to 0.1: 1 (-0.9). Equivalent (or opposite) developments in the relationship between exports and imports are accorded misleadingly imbalanced values.

As an alternative, the values of *exports: trade* fall between 0 and 1 (by construction) and are much less skewed. Continuing the example above, the rise in exports would increase *exports: imports + exports* from 0.5 to 0.91 (+0.41) while the equivalent increase in imports would reduce the relevant value to 0.09 (-0.41).

The final two indicators are thus:

IX. Trade balance as a percentage of GDP (SITC 784); and
X. Ratio of exports to total trade (SITC 784).

5.4.4 Operationalising covariates to account for time-varying heterogeneity

As discussed above, fixed effects control for the influence of unobserved time-invariant heterogeneity. The conceptual and theoretical framework developed in chapters 2 and 3 identified three location-specific (i.e. country level) advantages which determine automotive industrial performance: market size; industrial capabilities; and the national policy and institutional regime. In order to be included in the model, covariates must be time-varying and

cover a significant proportion of the panel, in terms of the number of countries covered and the number of observations available per country. Given the difficulties quantifying policy and institutional factors, in the main models discussed in the findings below, it is assumed that covariates for market size and industrial capabilities adequately capture the influence of time-varying factors on parts and components sector performance outcomes; aside from the policy under examination – LCRs – no further attempt is made to operationalise the time-varying impacts of policy and institutional heterogeneity. However, I also run additional models, the results of which are included in the appendices, incorporating policy variables for parts and components sector tariffs, and separate time trends for countries which are members of regional trade institutions with significantly lower intra-regional trade barriers in automotive products. For the most part, these latter variables do not produce significant coefficients; nor do they alter the most important findings in terms of the sign and significance of the coefficients for the post-treatment dummy variables. Finally, I construct a set of dummy variables to account for region-specific year effects, in case the empirical results are biased by unobserved time-varying heterogeneity at the regional level. Again, the estimation results are largely unaffected by the inclusion of these additional covariates.

5.4.4.1 Market size

There are two alternative sources of data for the market size covariate, both of which are based on production data, as opposed to automotive ownership, use, or sales. This is not ideal since issues of endogeneity, discussed above, are more likely to arise; vehicle production is likely to be jointly determined – to a greater extent than ownership or sales – by policy and institutional factors affecting parts supply (i.e. the policy treatment) and by the performance of the parts and component sector (i.e. the outcome variable). Unfortunately, such data are not available for the full panel, and would not permit the present research design. For example, sales data are available for most countries from the *Organisation Internationale des Constructeurs d'Automobiles* (International Organization of Motor Vehicle Manufacturers, hereafter referred to as OICA) from 2005. World Bank (2011) provides data for stocks of passenger cars and motor vehicles, but there are no data for the pre-treatment period.

The two indicators used in the present analysis are OICA (2015) data on vehicle production, and UNIDO (2011b) data on total automotive output (ISIC 34). In order to reduce skewness, I transform these data to ratio form and take their natural logs, constructing the following indicators:

I. Log vehicle production per capita; and
II. Log automotive output as a proportion of GDP.

The choice of indicator has implications relating the size and composition of the sample permitted by their inclusion. OICA production data are comprehensively available, from 1997, for only 35 WTO members[60] which may be classified as 'major automotive producers', as well as available in the form of estimated values, from 1999, for an additional 11 countries[61]. As shown in table 5-2 below, the 35 countries for which OICA production figures are comprehensively available comprise 23% of the sample of 152 WTO members on which this analysis is based, and include the majority (75%) of the treatment group, excluding Chile, Pakistan, the Philippines, and Vietnam.

[60] These are: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, the Czech Republic, Egypt, Finland, France, Germany, Hungary, India, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Poland, Portugal, Romania, the Slovak Republic, Slovenia, South Korea, Spain, Sweden, Taiwan, Thailand, Turkey, Ukraine, the US, and the UK.

[61] These are: Chile, Colombia, Kenya, Morocco, Nigeria, Pakistan, the Philippines, Uruguay, Venezuela, Vietnam and Zimbabwe.

Table 5-2: Cross-tabulation of treatment status and OICA production data status

	Treatment group			Control group			Total		
	No.	**Col. %**	**Row %**	**No.**	**Col. %**	**Row %**	**No.**	**Col. %**	**Row %**
Limited vehicle production and / or missing vehicle production data	4	25	3.4	113	83.1	96.6	117	77	100
Major vehicle producer	12	75	34.3	23	16.9	65.7	35	23	100
Total	16	100	10.5	136	100	89.5	152	100	100

Although the UNIDO (2011b) data for total automotive output cover a greater number of data points, with almost twice the number of observations and more than twice the number of countries with data points, these data are, on average, available for fewer years for each country (the mean number of observations per country is 10.31 for automotive output compared with 14.46 for the vehicle production data).

Appendices 3 and 4 show mean performance outcomes for the main dependent variables, for countries grouped according to their mean production of motor vehicles per capita, and their mean automotive output as a percentage of GDP, respectively. Countries with higher average levels of both market size indicators exhibit higher levels of performance outcomes, strengthening the case for their incorporation in the regression models. The market size covariates are also highly significant in most of the regression estimations analysed below.

Of course, the choice of indicator affects the nature of the comparison group. Compared with the wider sample of countries, countries with complete OICA data have significantly higher populations, incomes, levels of industrialisation and levels of motorisation – as shown in table 5-5 – although they span a wide range in each of these characteristics. It must therefore be considered that the choice of data will affect the empirical results, since the control groups against which performance is compared exhibit non-trivial differences in fundamental characteristics. Although the OICA data is narrower, it can be argued that this is a more appropriate comparison group; my strategy, therefore, has been to run regressions using both samples – i.e. with and without the OICA vehicle production data. As discussed in section 3.6, for the most part findings are consistent between the two samples.

5.4.4.2 Industrial capabilities

There are numerous ways in which capabilities may be conceived and operationalised (for an extended discussion see UNIDO, 2011c). For the purpose of this study, I am interested in the measurement of capabilities at the national level of aggregation in a manner that enables international comparison. Thus, despite their difficulties and shortcomings (Ravallion, 2010) I have decided to use a 'mash-up' or composite indicator of industrial capabilities: the UNIDO Competitive Industrial Performance (CIP) index.

One of the most crucial distinctions is between indicators of capabilities based on input (i.e. 'drivers' of industrial competitiveness) and output (i.e. performance) variables (UNIDO, 2011c: 16). Indeed, capabilities are closely bound up with industrial performance but are distinct. Input-based indicators result from the identification, measurement, and aggregation of factors affecting industrial performance – for example the presence of innovation activity, the quality of infrastructure, and inflows of FDI. Output based measures, of which the CIP index is an example, are constructed from data on the magnitude and composition of manufactured production and trade. These data refer to the manufacturing sector generically, of which parts and components sector capabilities are one part. Thus, despite some overlap between this indicator and the dependent variables of parts and components sector performance (data on which will contribute to the CIP index score), I have opted to use this indicator due to its comprehensive country coverage and availability of multiple years of data.

There have been several revisions of the index, with additional indicators being incorporated with each revision, ensuring that different revisions are not comparable over time. I have elected to use data from the Industrial Development Scoreboard (UNIDO, 2007) which has data for the years 1998 and 2003, thus covering the years during which LCRs were in effect and leading up to the period of liberalisation, and is thus relates to countries' dynamic performance over that period. In order to extend the data series beyond the two years for which data are reported, I have imputed a linear interpolation of the missing data[62].

Appendix 5 shows mean performance outcomes for the main dependent variables, for countries grouped according to their mean CIP index score. Countries with higher average levels of industrial capabilities exhibit higher levels of performance outcomes, strengthening the case for their incorporation in the regression models. Like market size, the industrial capabilities indicator is also highly significant in most of the regression estimations analysed below.

5.4.4.3 Additional specifications: additional policy and institutional covariates, and region-specific year effects

As discussed above, the main models for which findings are discussed below assume that the market size and industrial capabilities indicators adequately capture time-varying heterogeneity with respect to policy and institutional factors. Introducing additional policy and institutional indicators is problematic since if other reforms have been carried out in a broadly simultaneous timescale to the elimination of LCRs, as is likely to have been the case with tariff reduction, they may confound the estimation of the effect of the elimination of LCRs; similarly, if they are systematic differences in their presence between the treatment and control groups. Nevertheless, I construct additional models in which I control for the potential presence of two time-varying policy and institutional factors: parts and components tariff levels, and a separate time trend for members of institutions with substantial reductions in intra-regional automotive trade barriers.

Parts and components tariffs

Data on the simple average rate of tariffs for ISIC 343 were obtained from the WITS database. Missing data points were imputed by first filling missing values forwards, and then backwards. That is, where data were missing I first assumed that tariffs would have remained at the level of their last reported value. Where data were missing and there were no previously reported values, I assumed that tariffs would have prevailed at the level of the next available reported value. Finally, I log-transformed the imputed values.

Regional trade institutions

As discussed in chapter 3, automotive production networks are characterised by the regional nature. I identify four institutions in which substantial intra-regional trade liberalisation in automotive products has been established, since it is plausible that membership of these institutions substantially impacts the performance outcomes described above over time; these are ASEAN, EU, Mercosur and NAFTA. A large number of the treatment group – 9 out of 16 – are members of such organisations. Because time-invariant dummy variables are collinear with country fixed effects, I interact the dummy with a linear time trend.

[62] This process simply connects the data points with a straight line. It is reasonable to assume that a long term process such as industrial capability development would follow a broadly constant trend over time – or at least, would follow such a trend sufficiently closely for the purposes of our model. In any case, this interpolation covers changing industrial capabilities through the time period in which we are most concerned in this analysis.

Region-specific year effects

In order to construct a separate set of region-specific year effects, I interacted the categorical variable for geographical region, which divides countries into seven groups (East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa) with the variable 'year'.

5.4.5 Descriptive statistics

Table 5-3 reports the values of skewness for variables with and without log transformations. All of the variables incorporated into the final analysis have skewness values that fall within or are only slightly outside what Tabachnick and Fidell (2013) regard as the acceptable range (plus or minus 1.5). Table 5-4 reports basic statistics regarding the main dependent and independent variables and the number of available observations. Table 5-5 compares key variables across time, within the treatment and two control groups, using the untransformed data, and including some contextual structural characteristics not incorporated in the regression models. These data serve to illustrate the significant differences between the two alternative control groups discussed above, and also place the estimation results in context. The data show that although the group-level means of most of the performance indicators have increased significantly between the two time periods for all groups. The next stage is to examine whether there are significant differences-in-differences between the treatment and control groups, controlling for relevant covariates, country fixed effects, and common year effects.

Table 5-3: Skewness of untransformed and log-transformed indicators

Indicator	Skewness	Skewness, log transformation
Local content, constant 1995 USD	3.75	-0.59
Ratio of local content to apparent consumption	0.49	-1.54
Output, constant 1995 USD	4.34	-0.49
Output specialisation index	3.02	-1.00
Exports, constant 1995 USD	5.19	-1.54
Export specialisation / RCA index	2.38	-0.23
Imports, constant 1995 USD	5.62	0.13
Imports as a percentage of GDP	2.78	-1.38
Trade balance as a percentage of GDP	-0.76	-
Ratio of exports to total trade	0.99	-
CIP index	0.98	-
Vehicle production	3.14	-0.79
Vehicle production per capita	1.32	-1.03
Automotive output, constant 1995 USD	4.44	-0.28
Automotive output as a percentage of GDP	1.47	-0.82
Parts and components tariffs	2.09	-0.46

Table 5-4: Descriptive statistical information for main variables

	Mean	Std. Dev.	Min.	Max.	Number of obs.	Number of countries	Mean obs. per country
Independent variables							
$D_{it}^{Post\_all}$	0.59	0.49	0.00	1.00	2582	152	16.99
$D_{it}^{Post\_treated}$	0.06	0.24	0.00	1.00	2582	152	16.99
Log vehicle production per capita	-4.92	2.12	-12.77	-2.14	637	45	14.16
Log automotive output as a proportion of GDP	-4.87	2.01	-12.00	-1.81	1032	98	10.53
Interpolated CIP index	0.29	0.19	-0.08	0.97	1804	108	16.70
Log parts and components tariffs	11.58	9.96	0.00	73.24	2550	150	17.00
Interaction of RTA dummy and linear time trend	2.66	4.90	0	17	2584	152	17
Dependent variables							
Log local content, constant 1995 USD	19.91	3.36	10.36	25.79	439	56	7.84
Log local content as a proportion of app. cons.	-1.31	1.07	-6.26	-0.01	439	56	7.84
Log parts and components output, constant 1995 USD	19.41	3.73	7.84	25.93	692	69	10.03
Log output specialisation index	-1.58	2.08	-9.30	2.21	691	68	10.16
Log parts and components exports, constant 1995 USD	15.36	4.33	3.68	24.34	2522	150	16.81
Log export specialisation / RCA index	-2.99	2.33	-10.14	1.31	2501	149	16.79
Log parts and components imports, constant 1995 USD	17.74	2.72	6.99	24.28	2549	150	16.99
Log imports as a proportion of GDP	-5.85	0.94	-14.28	-3.37	2508	148	16.95
Trade balance as a percentage of GDP	-0.21	0.34	-3.22	1.88	2482	148	16.77
Ratio of exports to total trade	0.20	0.22	0.00	0.99	2522	150	16.81

Table 5-5: Mean indicator values by treatment status and time period

	Treatment		Control: major automotive producers		Control: wider sample		Total (all groups)	
	1995-2002	2002-2011	1995-2002	2002-2011	1995-2002	2002-2011	1995-2002	2002-2011
Structural characteristics								
Basic indicators								
Population (millions)	221.20	240.53	45.51	48.35	15.51	17.42	35.60	39.58
GDP (billions of constant 1995 USD)	250.3	405.2	1005.0	1201.0	189.9	231.9	195.9	249.5
GDP per capita (thousands of constant 1995 USD)	2.47	3.02	16.45	19.23	7.67	9.14	7.16	8.52
Industrial capabilities indicators								
CIP index	0.32	0.33	0.48	0.48	0.29	0.28	0.30	0.29
MVA as a percentage of GDP	22.21	21.79	20.86	18.47	14.32	13.22	15.16	14.15
FDI inflows as a percentage of GDP	2.97	3.15	3.14	3.97	3.87	5.49	3.78	5.25
Merchandise exports as a percentage of GDP	0.29	0.34	0.28	0.35	0.29	0.32	0.29	0.32
Automotive market indicators								
Vehicle production, thousands of units	559	1270	2042	1993	1728	1544	1327	1448
Vehicle production, units per thousand persons	5	8	39	41	33	32	24	24
Automotive output, millions of constant 1995 USD	11980	24360	59300	65820	19335	24269	18150	24280
Automotive output as a percentage of GDP	3.564	4.124	5.545	5.96	2.15	2.42	2.372	2.704
Parts and components sector outcomes								
Absolute indicators (millions of constant 1995 USD)								
GFCF	139	238	1029	1026	574	540	526	504
Local content	1984	10430	16110	16180	10388	9491	9024	9686
Output	2321	9959	17070	20160	8625	9422	7786	9513
Value added	934	2260	5946	6622	3379	3316	3017	3148
Exports	608	1725	4815	7004	826	1200	803	1256
Imports	996	1955	4350	6276	769	1110	793	1200
Trade balance	-388	-230	465	727	45	80	-1	46
Ratio indicators								
Output per vehicles produced (thousand constant 1995 USD)	5142	5166	5700	9217	5602	8773	5500	7725
Output as a percentage of GDP	0.64	1.15	1.32	1.83	0.73	0.92	0.71	0.96
Exports as a percentage of GDP	0.22	0.45	0.68	1.01	0.17	0.23	0.17	0.26
Imports as a percentage of GDP	0.40	0.59	0.91	0.98	0.45	0.40	0.45	0.42
Trade balance as a percentage of GDP	-0.18	-0.14	-0.23	0.03	-0.29	-0.17	-0.28	-0.16
Local content / apparent consumption	0.54	0.58	0.46	0.43	0.36	0.34	0.39	0.39
Output specialisation index	0.51	0.91	1.04	1.41	0.57	0.71	0.56	0.75
Export specialisation index (RCA)	0.44	0.72	1.08	1.37	0.26	0.31	0.28	0.36

5.5 FINDINGS

5.5.1 Presentation of findings and interpretation of point estimates

In the following sections, I discuss the estimation results for each dependent variable operationalised in section 5.4.3. Within each of local content (section 5.5.2), output (section 5.5.3), exports (section 5.5.4), imports (section 5.5.5) and trade balance (section 5.5.6), I provide findings for two alternative indicators. In the cases of local content, output, exports and imports, these correspond to log transformed absolute indicators and log transformed ratio indicators. In the case of trade balance, the indicators are trade balance as a proportion of GDP and the ratio of exports to total trade.

In each section, I provide a table of estimation results for models incorporating country and year fixed effects and cluster robust standard error estimation; these are referred to as the main specifications. Models (1) and (2) pertain to the narrower sample of large automotive producers and incorporate OICA data on log transformed vehicle production as a covariate for market size. Models (3) and (4) pertain to a wider sample and incorporate log automotive output as a covariate for market size. For each dependent variable, I describe the models and summarise their overall fit and the direction and magnitude of the estimated impacts of covariates.

I also provide a brief discussion of diagnostic tests, in order to justify the validity of my model specification. Specifically, I carry out the following diagnostic tests[63]:

- The test for country-specific (random) effects is a Breusch and Pagan Lagrangian Multiplier test for significant differences between cross-sectional units, performed using the Stata command xttest0. The null hypothesis is that variances across entities is zero; $p<0.05$ indicates that we reject the null and conclude that the random effects model is more appropriate than pooled OLS. The test is performed with the Stata command *xttest0.*
- The test for fixed versus random effects is a Wald test for over-identification of additional restrictions in FE model; unlike the standard Hausman test, it extends to heteroskedastic- and cluster-robust model specifications. The null hypothesis is that the additional restrictions are not jointly significant and random effects are preferred. The test is performed through the user-written Stata programme *xtoverid*.
- The test for joint significance of year-specific effects is a Wald test of the null hypothesis that year dummy coefficients are jointly equal to zero. It is performed by the Stata command *testparm*.
- The test for heteroskedasticity calculates a modified Wald statistic for groupwise heteroskedasticity in the residuals of fixed effects models, under the null hypothesis of homoskedastic errors, following Greene (2000). It is performed via the user-written Stata programme *xttest3*.

[63] I have also carried out joint tests for normality of residuals, which combines tests for skewness and kurtosis into an overall test statistic, under the null hypothesis that the residuals follow a normal distribution. Invariably, these tests strongly reject the null hypothesis of normality. It should be noted, however, following Gelman and Hill (2007), that a non-normal distribution of errors does not affect the parameter estimates in fixed effects models. Arguing that the normality is "generally the least important of all" linear regression assumptions, the authors do not recommend diagnostics of the normality of regression residuals (p. 46). Wooldridge (2012) concurs that although non-normality of the error is a "potentially serious problem... we can use central limit theorem" to conclude that estimators "are approximately normally distributed in large enough sample sizes" (pp. 173-4). Furthermore, as Diehr and Lumley (2002) observe, "formal statistical tests for normality are especially undesirable as they will have low power in the small samples where the distribution matters and high power only in large samples where the distribution is unimportant". As a result, I do not report the results of normality tests here.

- The test for serial correlation checks for the presence of serial correlation in residuals of linear panel data models by regressing first-differenced variables under the null hypothesis of no serial correlation. The test is a user-written Stata programme *xtserial* (Drukker, 2003).

I then briefly discuss estimation results for the same dependent variables but alternative model specifications, which are provided in the appendices. These are as described for the main specifications, but also incorporate the following additional features respectively:

- Covariates for log parts and components tariffs and separate time trends for members of regional institutions with significantly reduced barriers to intra-regional trade
- Region-specific year effects

As discussed above, most of the dependent and independent variables are log transformations of continuous variables. A word needs to be said here about the interpretation of the point estimates when dependent variables take the log form.

In the model $\log(Y) = \beta \log(X)$, the coefficient β is interpreted as the proportional change in Y for a change in X. Thus, a 1% change in X yields a $\beta\%$ change in Y. For ease of exposition, we can multiply the coefficient by 100 to get the change in Y as a percentage of any change in X (Wooldridge, 2012: 190).

In the interpretation of the coefficients on variables not expressed in log form, such as in the model $\log(Y) = \beta(X)$, a one *unit* increase in X yields an approximately $100 \cdot \beta\%$ change in Y. In fact, the exact % change in Y with respect to X is given by $\%\Delta Y = 100 \cdot [\exp(\beta) - 1]$. According to Wooldridge (ibid.), a discrepancy arises for large values of β, as the approximate percentage change falls between the exact value pertaining to a unitary increase in X and that pertaining to a unitary decrease in X.

Moving to the interpretation of the dummy variables, this implies that the interpretation of φ in the in the model $\log(Y) = \beta \log(X) + \varphi D$ depends on whether the dummy moves from zero to one or from one to zero. As an approximation, "the coefficient on a dummy variable, when multiplied by 100, is interpreted as the percentage difference in Y, holding all other factors constant" (Wooldridge, 2012: 232). More exactly, if D switches from 0 to 1, the % impact of the policy change on Y is

$$100 \cdot [exp(\varphi) - 1]$$

and if D switches from 1 to 0, the % impact of the policy change on Y is

$$100 \cdot [exp(-\varphi) - 1]$$

The difference depends upon which 'state' of D is considered to be the base group from which the percentage change is calculated. In most cases, the approximation $\%\Delta Y = 100 \cdot \varphi$ suffices, since it always falls between the two values (ibid).

5.5.2 Local content

Estimation results for models with local content dependent variables are summarised in table 5-6, below. As demonstrated by high R^2 values, the models offer good explanatory power for the determination of log local content, although the explanatory power of the log local content ratio is much weaker. In three of the models – (1), (3) and (4) – the market size covariate is highly significantly associated with local content, although the industrial capabilities covariate is insignificant in all models, suggesting that high levels of local content can be obtained without strong capabilities in the presence of protective policies.

Turning to diagnostics (details of which are described in section 5.5.1, above), highly significant test results for country-specific effects, fixed vs. random effects, and joint significance of year dummies confirm the appropriateness of the two-way fixed effects model vis-à-vis alternative specifications. Post-estimation analysis of regression residuals confirms the presence of serial correlated and heteroskedastic error terms, justifying the use of cluster-robust standard errors.

The key finding is that the elimination of LCRs has had a significant and negative impact on local content in three of the four models, while in model (2) the coefficient for $D_{it}^{Post\_treated}$ is negative but not significant. In terms of the size of this impact, point estimates of around -.4 indicate an approximate reduction of local content by around 40% in the post-treatment period relative to pre-treatment outcomes which is consistent across both samples. The point estimate for model (4) indicates that for the wider sample, there has been an approximate reduction of 28% in the ratio of local content to apparent consumption associated with the elimination of LCRs.

Turning to the alternative specifications presented in appendices 7 and 8, these findings are broadly consistent with the main specification. In the specifications incorporating log tariffs and separate time trends for countries with significant regional trade institutions, point estimates for $D_{it}^{Post\_treated}$ remain negative at a high level of statistical significance for models (3) and (4). The coefficient loses significance for model (1), but remains negative. Interestingly, neither of the additional covariates are statistically significant in these models. Finally, in the specifications incorporating region-specific year effects, the signs and significance levels of the coefficients for $D_{it}^{Post\_treated}$ are very similar to those presented in table 5-6.

In sum, the findings are consistent with expectations that LCRs promote the use of local parts and components in assembly compared to imported parts and components, and that eliminating these policies will have reduced the importance of locally-manufactured parts and components within the production networks of domestic assemblers, vis-à-vis imports. This is an important finding as it suggests that LCRs have promoted the integration of local suppliers in national automotive value chains, and the elimination of LCRs has led to a reduction in local content and a consequent increase in imports. Taking local content as an indicator of industrial performance, this finding appears, at face value, to suggest that the elimination of LCRs has had negative consequences. However, as discussed below, this finding must be considered in light of findings for alternative indicators, which invite an alternative perspective on the developmental value of the elimination of LCRs, as discussed in subsequent sections.

Table 5-6: Estimation results: local content dependent variables: two-way fixed effects with cluster robust standard errors

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log local content**	**Log local content / apparent consumption**	**Log local content**	**Log local content / apparent consumption**
Independent variable point estimates and standard errors				
$D_{it}^{Post\_all}$	0.00724	-0.0995	0.254	0.0694
	(0.132)	(0.0937)	(0.186)	(0.0861)
$D_{it}^{Post\_treated}$	-0.425*	-0.169	-0.409***	-0.277***
	(0.238)	(0.169)	(0.122)	(0.101)
Log vehicle production per capita	1.012***	0.242		
	(0.236)	(0.159)		
Log automotive output as a proportion of GDP			1.225***	0.731***
			(0.126)	(0.207)
Interpolated CIP index	5.220	2.615	2.541	0.135
	(3.106)	(2.214)	(1.942)	(1.279)
Diagnostic statistics				
Observations	257	257	431	431
Number of countries	27	27	53	53
Mean observations per country	9.52	9.52	8.13	8.13
R-squared	0.63	0.15	0.64	0.32
Test for country-specific (random) effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for fixed vs. random effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for joint significance of year-specific effects	[0.0000]	[0.0144]	[0.0012]	[0.0539]
Test for heteroskedasticity	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for serial correlation	[0.0170]	[0.0661]	[0.0092]	[0.0261]

Notes: Point estimates are reported without parentheses; *** signifies p<0.01, ** signifies p<0.05, and * signifies p<0.1. Standard errors are reported in round brackets '( )' and p values in square brackets '[ ]'.

5.5.3 Output

Estimation results for models with output dependent variables are summarised in table 5-7, below. The four models offer good explanatory potential with R^2 values ranging from .45 to .66. In all the models, market size and industrial capability covariates are positively and highly significantly associated with output indicators, in line with theoretical expectations.

Turning to diagnostics, as above, highly significant test results confirm the appropriateness of the two-way fixed effects model incorporating cluster-robust standard errors vis-à-vis alternative specifications.

The important finding here is that in contrast to the findings pertaining to local content, the elimination of LCRs has had no statistically significant impact on output among countries eliminating LCRs that is distinguishable to the impact experienced within the wider population.

Turning to the alternative model specifications presented in appendices 9 and 10, the general thrust of this finding is confirmed, although some specifications point to the presence of small but statistically significant negative effects on output indicators. In the specifications with the additional policy and institutional covariates the coefficients are insignificant, and inconsistent in terms of their signs. Finally, in the specifications incorporating region-specific year effects coefficients for $D_{it}^{Post\_treated}$ are negative in all models, but only significantly so in model (2). Therefore, it is unlikely, depending upon the validity of the various specifications examined here, that the elimination of LCRs has had a negative impact on output, controlling for other factors.

This finding reflects the fact that the impact of the elimination of LCRs on output appears to depend on the magnitude of two conflicting phenomena: on the one hand, liberalisation of LCRs threatens uncompetitive import-substituting firms by permitting assemblers to source parts and components from abroad; on the other, it encourages export-oriented production and investment of both parts and components and finished vehicles by reducing the costs of inputs and providing greater opportunities to access foreign markets. The net impact of these changes is that there appears to be no significant impact on output arising from the elimination of LCRs. Thus, although local content levels have fallen significantly, any consequent impact on the magnitude of parts production overall must have been counterbalanced by increases in export orientation. This result – which is substantiated in subsequent sections for the dependent variables exports, imports and trade balance – appears to offer an important refutation of the contention that the elimination of LCRs would lead to the widespread substitution of inefficient domestic supply networks with imported parts and components, and a generalised contraction in production in the treatment group.

Table 5-7: Estimation results: output dependent variables: fixed effects with cluster robust standard errors

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log output**	**Log output specialisation index**	**Log output**	**Log output specialisation index**
Independent variable point estimates and standard errors				
$D_{it}^{Post\_all}$	-0.148*	-0.241*	0.110	0.0192
	(0.0778)	(0.118)	(0.182)	(0.130)
$D_{it}^{Post\_treated}$	-0.0212	0.0395	-0.188	-0.112
	(0.149)	(0.162)	(0.189)	(0.163)
Log vehicle production per capita	0.599***	0.368***		
	(0.124)	(0.105)		
Log automotive output as a proportion of GDP			0.718***	0.673***
			(0.136)	(0.127)
Interpolated CIP index	7.171**	5.682***	1.483	0.228
	(2.675)	(2.058)	(1.406)	(1.233)
Diagnostic statistics				
Observations	334	334	662	662
Number of countries	31	31	64	64
Mean observations per country	10.77	10.77	10.34	10.34
R-squared	0.66	0.56	0.51	0.45
Test for country-specific (random) effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for fixed vs. random effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for joint significance of year-specific effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for heteroskedasticity	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for serial correlation	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Notes: Point estimates are reported without parentheses; *** signifies p<0.01, ** signifies p<0.05, and * signifies p<0.1. Standard errors are reported in round brackets '( )' and p values in square brackets '[ ]'.

5.5.4 Exports

Estimation results for models with export performance dependent variables are summarised in table 5-8, below. The models for the export indicators offer good explanatory power for the smaller sample of large automotive producers but explain far less of the variation in models (3) and (4), perhaps reflecting the greater potential for measurement error, and the statistically insignificant association between market size and export performance, within the larger sample. In all four models across both samples, industrial capabilities are highly significantly associated with export performance, in line with theoretical expectations.

Again, as for the local content and export dependent variable models, highly significant test results confirm the appropriateness of the two-way fixed effects model incorporating cluster-robust standard errors vis-à-vis alternative specifications, although we fail to reject the null hypothesis of serial correlation in models (3) and (4).

Despite the low R^2 values in models (3) and (4), it is remarkable that the $D_{it}^{Post\_treated}$ coefficient is positive and highly significant across all four models. Coefficients represent an approximately 40-65% increase in export indicators in the post-treatment period, for the treatment group relative to the control group. These findings are borne out in the alternative specifications, the results of which are summarised in appendices 11 and 12, which show highly significant positive effects on exports, of similar magnitudes to those in table 5-8, across all models. There is no doubt that export performance outcomes indicate significant improvements in the competitiveness of parts and components sectors in countries in which LCRs have been eliminated, providing explanation for the findings discussed in the previous sections, that local content has fallen with no corresponding reduction in output overall. This finding is also borne out in relation to the point estimates for the models featuring import dependent variables, which are smaller in magnitude than those for exports, as discussed next.

Table 5-8: Estimation results: export dependent variables: fixed effects with cluster robust standard errors

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log exports**	**Log export specialisation (RCA) index**	**Log exports**	**Log export specialisation (RCA) index**
Independent variable point estimates and standard errors				
$D_{it}^{Post\_all}$	-0.103	-0.0994	-0.286	-0.234
	(0.126)	(0.115)	(0.178)	(0.168)
$D_{it}^{Post\_treated}$	0.393**	0.447***	0.645***	0.509***
	(0.151)	(0.125)	(0.199)	(0.177)
Log vehicle production per capita	0.448***	0.164***		
	(0.0807)	(0.0467)		
Log automotive output as a proportion of GDP			0.0365	-0.0332
			(0.101)	(0.0992)
Interpolated CIP index	7.311***	5.851***	7.364**	6.620**
	(1.319)	(0.894)	(3.214)	(2.962)
Diagnostic statistics				
Observations	480	480	973	969
Number of countries	32	32	90	90
Mean observations per country	15	15	10.81	10.77
R-squared	0.80	0.54	0.37	0.15
Test for country-specific (random) effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for fixed vs. random effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for joint significance of year-specific effects	[0.0000]	[0.0000]	[0.0000]	[0.0105]
Test for heteroskedasticity	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for serial correlation	[0.0001]	[0.0002]	[0.4966]	[0.5143]

Notes: Point estimates are reported without parentheses; *** signifies p<0.01, ** signifies p<0.05, and * signifies p<0.1. Standard errors are reported in round brackets '( )' and p values in square brackets '[ ]'.

5.5.5 Imports

Estimation results for models with import dependent variables are summarised in table 5-9, below. Again, the reduced sample of models (1) and (2) offers better explanatory potential as indicated by the higher R^2 values. It is also interesting to note that in models (1) and (2), there is a stronger relationship between vehicle production and imports than between vehicle production and exports. This is theoretically consistent: since exports depend strongly on foreign markets, they are expected to correlate more weakly with the domestic market. Conversely, the relationship between industrial capabilities and imports is weaker than between industrial capabilities and exports; again, consistent with theoretical expectations, since exports require a degree of technological competence in local firms that is not required to enable imports. Once again, diagnostic tests confirm the appropriateness of the models against alternative specifications.

The key finding is that the point estimates for $D_{it}^{Post\_treated}$ suggest an association between the elimination of LCRs and imports that is smaller in magnitude, and less certain, compared to the findings for exports. In the models with the smaller sample, coefficients are insignificant while in the wider sample, they are significant and positive but considerably smaller than the point estimates from the equivalent export models, at .44 and .41 compared with .65 and .51.

The findings are confirmed in the alternative specifications, results of which are summarised in appendices 13 and 14. In specifications incorporating additional policy and institutional covariates, coefficients have the same signs and similar magnitudes and significance levels as in table 5-9; interestingly, the coefficients for the tariff level covariate are insignificant. In the specifications incorporating region-specific year effects, coefficients on $D_{it}^{Post\_treated}$ are larger than reported in table 5-9, and are significant in model (1), but in all cases except model (4) – which has a very low R^2 value – coefficients are lower than the corresponding coefficients for the export dependent variable models.

These findings provide tentative support for the contention that the elimination of LCRs has had a positive impact on trade performance, enhancing exports more than imports; this is examined further in the following models, which examine trade balance explicitly.

Table 5-9: Estimation results: import dependent variables: fixed effects with cluster robust standard errors

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log imports**	**Log imports as a proportion of GDP**	**Log imports**	**Log imports as a proportion of GDP**
Independent variable point estimates and standard errors				
$D_{it}^{Post\_all}$	0.0774	0.0571	-0.168	-0.200**
	(0.119)	(0.0972)	(0.104)	(0.0884)
$D_{it}^{Post\_treated}$	0.111	0.162	0.441**	0.412***
	(0.188)	(0.160)	(0.186)	(0.148)
Log vehicle production per capita	0.582***	0.341***		
	(0.0780)	(0.0523)		
Log automotive output as a proportion of GDP			0.0673	0.0623
			(0.0710)	(0.0654)
Interpolated CIP index	1.534	0.197	3.015**	1.481
	(1.279)	(1.133)	(1.446)	(1.271)
Diagnostic statistics				
Observations	480	480	977	977
Number of countries	32	32	91	91
Mean observations per country	15	15	10.74	10.74
R-squared	0.82	0.47	0.42	0.11
Test for country-specific (random) effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for fixed vs. random effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for joint significance of year-specific effects	[0.0000]	[0.0000]	[0.0000]	[0.0001]
Test for heteroskedasticity	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for serial correlation	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Notes: Point estimates are reported without parentheses; *** signifies p<0.01, ** signifies p<0.05, and * signifies p<0.1. Standard errors are reported in round brackets '( )' and p values in square brackets '[ ]'.

5.5.6 Trade balance

Table 5-10 shows estimation results for the main specifications for the trade balance dependent variables. These models have much lower R^2 values, ranging from .11 to .43, compared to the previous dependent variables, reflecting the greater theoretical ambiguity regarding determinants of trade balance indicators over time. The coefficient for market size is insignificant in all of these models; as demand increases, it can be supplied either via imports or via domestic producers which may also export abroad. There is therefore no significant uniform relationship between market size and trade balance indicators across the samples analysed here. However, industrial capabilities are positively and significantly associated with net exports as a percentage of GDP and exports as a proportion of total trade.

As for the results discussed in the previous four sections, diagnostic statistics strongly confirm the appropriateness of the fixed effect model and the incorporation of cluster-robust standard errors, although in model (2) we reject the joint significance of year dummies at the 10% level.

Turning to the coefficient on $D_{it}^{Post\_treated}$ the findings reflect an ambiguous relationship between the elimination of LCRs and trade balance indicators measured by net exports as a proportion of GDP and by exports as a proportion of total trade. As discussed in section 5.4.3 above, it is possible for net exports to fall while the ratio of exports to trade rises within individual countries, and this is what appears to have occurred. Coefficients for the former indicator are negative, although statistically insignificant, whereas coefficients for the latter are positive and significant at the 5% level for model (2) and the 10% level for model (4).

Turning to the alternative specifications reported in appendices 15 and 16, in specifications incorporating the additional policy and institutional covariates, and the region-specific year effects, the relationship between $D_{it}^{Post\_treated}$ and the ratio of exports to total trade becomes less significance in model (2) and becomes insignificant in model (4).

From these results, it is difficult to draw any concrete conclusions about the relative impacts of the elimination of LCRs on import and export growth; exports have risen more rapidly in proportional terms, but from a low base, such that imports appear to have increased more rapidly in absolute terms. However, the latter effect is statistically insignificant. The overall interpretation of these findings in combination is discussed in the following section.

Table 5-10: Estimation results: trade balance and export ratio dependent variables: fixed effects with cluster robust standard errors

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Trade balance as a percentage of GDP**	**Exports as a proportion of trade**	**Trade balance as a percentage of GDP**	**Exports as a proportion of trade**
Independent variable point estimates and standard errors				
$D_{it}^{Post\_all}$	0.0366	-0.0331	0.0378	-0.0231
	(0.0838)	(0.0453)	(0.0627)	(0.0361)
$D_{it}^{Post\_treated}$	-0.0708	0.0580**	-0.0597	0.0437*
	(0.122)	(0.0277)	(0.0919)	(0.0240)
Log vehicle production per capita	-0.124*	-0.0327*		
	(0.0726)	(0.0162)		
Log automotive output as a proportion of GDP			0.00569	0.00510
			(0.0214)	(0.0119)
Interpolated CIP index	5.466***	1.296***	2.004**	0.654*
	(0.915)	(0.206)	(0.886)	(0.376)
Diagnostic statistics				
Observations	480	480	973	973
Number of countries	32	32	90	90
Mean observations per country	15	15	10.81	10.81
R-squared	0.43	0.32	0.16	0.11
Test for country-specific (random) effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for fixed vs. random effects	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for joint significance of year-specific effects	[0.0005]	[0.2923]	[0.0628]	[0.0104]
Test for heteroskedasticity	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Test for serial correlation	[0.0000]	[0.0000]	[0.0000]	[0.0018]

Notes: Point estimates are reported without parentheses; *** signifies p<0.01, ** signifies p<0.05, and * signifies p<0.1. Standard errors are reported in round brackets '( )' and p values in square brackets '[ ]'.

5.5.7 Summary and interpretation of findings

Without question, the findings discussed in the preceding section suggest strongly that, controlling for theoretically relevant covariates and country fixed effects, the elimination of LCRs has been significantly associated with changes in industrial performance indicators in those countries where they were previously in force. The estimation results show that local content, both in absolute terms and as a proportion of apparent consumption, have fallen in the post-treatment period. Output, in absolute terms and expressed as a proportion of GDP, has also fallen, but the reduction was statistically insignificant and smaller in magnitude. Exports, and to a lesser extent imports, have increased dramatically and significantly; the ratio of exports to total trade has increased, suggesting that exports have grown proportionally more than imports. The overall impact on trade performance as measured by net exports as a proportion of GDP is negative but insignificant.

The implications of these findings are that the elimination of LCRs appears to have led to significant increases in trade openness with no corresponding reduction in production; contrary to pessimistic expectations, the liberalisation of LCRs is associated with greater integration of domestic production into global networks rather than the decimation of production and floods of imports into liberalising countries.

While there is no doubt that parts and components suppliers are significantly more competitive on the world stage in the post-liberalisation environment, the findings actually leave a number of important unanswered questions in the context of my research goals. These relate to causal explanation and the causal mechanisms through which the observed impacts occur, the possibility that post-treatment performance improvements are partly determined by cumulative impacts arising from LCRs in the previous period, the possibility of time-varying heterogeneity between the treatment and control groups more generally, and the possibility that the impact of the elimination of LCRs may not be homogenous within the treatment group.

In this stage of my research design, in which causal mechanisms are obscured by the variable-oriented nature and goals of the analysis, it is impossible to distinguish between alternative interpretations. One mechanism is that the liberalisation of LCRs has altered the behaviour of existing local firms, reducing the opportunities for rent-seeking, encouraging export-oriented production, and providing incentives for product and process upgrading to cope with competitive pressures. An alternative and perhaps complementary explanation is that faced with import competition, local firms have left the market and been replaced with global suppliers with more extensive linkages with subsidiaries abroad and operating at more efficient levels of scale. The elimination of LCRs may have encouraged assembly production where previously it was discouraged, driving complementary investment in supply networks, or conversely it may have had little impact on assembler decisions. Likewise, the elimination of LCRs may have encouraged or discouraged technology transfer from automakers to local suppliers. The point is, based on the evidence here, which indicates (on balance) greater competitiveness, we are unable to explain the mechanisms behind this effect. Yet these questions have hugely important implications for our understanding of the developmental impacts of restrictions on policies such as LCRs.

The examination of causal mechanisms can also help to clarify matters relating to the presence of causal relationships in instances when the assumptions required for causal inference from cross-case, statistical analysis break down. Provided that the models are correctly specified and that the assumptions discussed in section 5.3 approximately pertain, we can interpret significant statistical associations as causal effects. One of the core assumptions is that treatment and control groups are subject to common time trends in the absence of treatment, except to the extent that factors

driving heterogeneity are incorporated into the analysis as covariates. However, if important time-varying factors are omitted, the interpretation of the DID estimator as a causal effect becomes problematic; and this is likely to be the case, since we know that the treatment and control groups differed in one crucial respect in the pre-treatment period: with respect to their use of LCRs. If LCRs give rise to time-varying heterogeneity between treatment and control groups, the observed performance outcomes in the post-treatment period would be influenced by the implementation of LCRs in the pre-treatment period. To turn from abstract to more concrete concerns, LCRs may have been crucial in establishing conditions under which the observed positive impacts of liberalisation were possible, by allowing firms to 'learn by doing' and providing scope for more efficient economies of scale by providing protected domestic market, as in the classic infant industrial logic. In this instance, it is impossible to infer from the findings that it would be beneficial if the treatment group had not implemented LCRs on the first place.

More generally, the plausibility of other forms of time-varying heterogeneity complicate the interpretation of $D_{it}^{Post\_treated}$ as a causal effect. As discussed in chapter 3, emerging markets have become particularly important within the strategies of automotive lead firms in the past 20-30 years, both as a result of their market size, growth and potential and as low cost manufacturing locations. The factors were introduced as covariates in the panel regression. However, interpretation of the DID estimator as causal effect requires that time-varying covariates are exogenous (or independent from one another). Market size and industrial capabilities are not strictly exogenous since they are influenced by policy and institutional factors, one of which includes the variable of interest here: the elimination of LCRs. To the extent that the latter serves to contribute towards a reduction in the price of vehicles, thus enhancing the size of the market, or influences the CIP score through an impact on industrial performance, the models developed here may understate any observed impacts of the elimination of LCRs on industrial performance outcomes. Perhaps more importantly, policy and institutional factors, also identified as crucially important in my review of the literature, were only fairly superficially operationalised for consideration in supplementary specifications. While the limited incorporation of policy and institutional variables into quantitative models is largely unavoidable, nevertheless, given the potential for the observed outcomes of the elimination of LCRs to be confounded by the adoption of alternative policies aimed at promoting domestic parts and components production, this may be a significant omission.

Finally, the present chapter is based on the assumption of causal homogeneity with respect to the treatment effect. In fact, there are strong theoretical reasons, discussed in chapter 2, to assume that the elimination of LCRs would indeed lead to divergent effects, based on the interaction or conjunction of the policy change with varied location-specific advantages. Indeed, as I discuss in the following chapter, a comparison of descriptive statistics on performance outcomes in the pre- and post-treatment periods show considerable variation across the treatment group which suggests that the impacts of the elimination of LCRs may not have been uniform.

These limitations have guided my choice of research questions and my decision to supplement the analysis above with historical institutionalist, comparative case studies, which comprise the following chapter.

6 COMPARATIVE CASE STUDIES

6.1 CHAPTER OUTLINE

Having presented the findings from the panel regression analysis, in the present chapter I examine the elimination of LCRs from an alternative methodological perspective. The historical institutional perspective permits examination of the causal mechanisms through which relationships between causes and outcomes are established, namely the activities, decisions and strategies of local and global firms in response to the advantages and policies in different countries. Whereas the DID approach of the previous chapter assumed that any differences between countries were time-invariant, the case studies offer the potential for more comprehensive operationalisation of the complex policy and institutional factors that provide the context in which LCRs were implemented and eliminated. As a result, from this perspective, we are able better to examine and unpick the complex conjunctive and path dependent causal processes that influence industrial performance outcomes.

In the quantitative stage, causal homogeneity was assumed across the broader global population, with heterogeneity captured by observed covariates. Here, we only apply the assumption of causal homogeneity across the smaller and arguably more homogenous population of LCR-users. However, as I discuss below, there is still a considerable degree of diversity within this population, the details of which inform my selection of cases. Looking at multiple cases also enables comparison of conjunctions of causal conditions that lead to different outcomes, and facilitates generalisation about the diverse impacts that arise when the implementation and elimination of LCRs occur in conjunction with different locations-specific advantages.

The chapter is structured as follows. In section 6.2, I attend to the analytical strategy of the case studies. This involves recapping the conceptual and theoretical framework developed in chapter 2 before describing the operationalisation of key variables. I then describe the goals of my case studies explicitly in relation to the research questions associated with this stage of the research. In section 6.2.4, I attend to the selection of cases, through which I identify three pairs of cases from separate regional institutional configurations, in order to facilitate comparison of outcomes according to the method of difference. This involves briefly reviewing trends in performance indicators over the post-WTO period, in which LCRs were eliminated. In section 6.2.5, having identified three pairs of case to examine, I describe the structure of each paired comparison. The final three sections of the chapter are devoted to providing the substantive details of each case.

6.2 ANALYTICAL STRATEGY

6.2.1 Conceptual and theoretical framework

To summarise the conceptual and theoretical framework adopted in the present analysis, as detailed more extensively in chapter 2, the impact of the implementation and elimination of LCRs on industrial performance is argued to be ambiguous, depending on the conjunction of each with a host of location-specific advantages. These advantages were defined as relating to market size, industrial capabilities, and the policy and institutional regime. LCRs may be justified in the presence of market failures in technological capability development and coordination failures that prevent the establishment of efficient linkages, leading to suboptimal parts and components outcomes in the absence of intervention. The static effects of LCRs are unambiguously distortionary and welfare-reducing, but considered in a dynamic framework, are more ambiguous.

The presence of advantages determines the extent to which efforts to overcome these market failures are likely to be successful; to simplify, effective LCRs require that locally-based suppliers can rapidly upgrade their competences and achieve efficient levels of productive scale. This, in turn, hinges upon market and non-market conditions affecting assemblers and suppliers alike. Ceteris paribus, within advantageous locations LCRs are more likely to elicit favourable performance outcomes through the causal mechanisms of (import-competing) inward investment, the achievement of more efficient levels of scale, technological upgrading within suppliers and technology transfer between assemblers and suppliers.

Similarly, advantageous locations are expected to be a favourable position with respect to their adjustment to the liberalisation of LCRs. This may be partly because of the more positive impacts of LCRs in the previous period in helping to overcome market failures, according to a logic of cumulative causation, but more generally, in the absence of trade restrictions, investment may be diverted from less-advantageous locations in which parts and component production had previously occurred as a result of LCRs.

In sum, the conceptual and theoretical framework adopted here incorporates complex (cumulative and conjunctive) causation, in which the impacts of the implementation and elimination of LCRs may diverge according to the causal condition present in the contexts in which they occur. Impacts on industrial performance outcomes are manifested through the mechanisms of investment patterns and global value chain developments.

6.2.2 Operationalisation of causes, mechanisms and outcomes

In the previous chapter, I attended to the operationalisation of indicators of industrial performance and relevant covariates available in comprehensive, cross-national formats. To the extent that these indicators remain pertinent, I retain them for the present stage of my research. However, as discussed above, one of the core strengths of case-oriented approaches is the richness afforded by more comprehensive data. One aspect of this is the ability to examine and compare individual indicators over time, in order to see how outcomes play out in conjunction with specific causal conditions. Another is that examining individual cases in detail permits the incorporation of national data and secondary sources which are not available for large ‘n’ studies. This is crucially important, as data on causal mechanisms – investment patterns and developments in value chain governance structures – comprise the basis of my case studies’ contribution to the research problem. In the case of the latter, I rely heavily on secondary data sources encountered reviewing the academic literature.

6.2.2.1 Causes: location-specific advantages

As discussed extensively in previous sections and chapters, location-specific advantages in the automotive parts and components sector relate to the attractiveness and stability of the business and investment environment, which can be seen as comprising three interrelated elements: market size, industrial capabilities, and the policy and institutional regime. The sources of data for market size and industrial capabilities broadly conform to the previous chapter, with the addition of some additional national and secondary sources of data. However, the operationalisation of the policy and institutional regime differs markedly and requires some explanation. In the historical institutionalist approach adopted here, I use primary and secondary sources to build up as comprehensive a picture as possible – given space restrictions – of policies and institutions affecting the automotive sector in the pre-WTO era and how they have evolved over time. Factors considered include formal policies such sector-specific tariffs, investment performance requirements, and fiscal policies, as well as more qualitative assessments of institutional characteristics, such as the nature of public-private partnerships. These causal conditions form the contexts in which the elimination of LCRs have occurred, and are called upon to explain the divergent performance outcomes and mechanisms observed to have arisen.

6.2.2.2 Mechanisms: FDI and developments in value chain governance

Data on the causal mechanisms through which industrial performance outcomes arise also come from a number of sources. One of the most important mechanisms, and one that assumes a central importance in my analysis, is foreign direct investment. FDI data are not available in a cross-national format at the requisite degree of sectoral disaggregation, so I have taken FDI data from a variety of national sources. Data pertaining to investment in the transport or automotive sectors generically are more widely available, and although these data do not differentiate the assembly and parts subsectors, they are nevertheless instructive of the strategies of MNCs – including lead firms and parts suppliers – in relation to locational advantages. These include the following:

- Japanese FDI outflows, transport equipment (ASEAN-Japan Centre, 2015, Japanese Ministry of Finance 2015).
- US FDI outflows, transport equipment (US Bureau of Economic Analysis, 2015).

More detailed data on parts and component sector investment are available from national sources such as manufacturers associations, as well as from secondary sources. The secondary data include those on specific investments (or 'waves' of investment), but perhaps more importantly, allow us to build up a comprehensive picture of evolving governance structures, including:

- relationships between assemblers and suppliers;
- the level of integration of local firms into national, regional and global trade networks;
- concentration and denationalisation of ownership;
- technological capability development and technology transfer;
- relocation of different value chain activities; and
- differential capacities for firms to capture higher value activities.

6.2.2.3 Outcomes: industrial performance in the parts and components sector

Many of the concepts are simply operationalised following the specification of my panel model, as detailed in the previous chapter. However, as discussed above, one of the strengths of the present approach is the richness afforded by more comprehensive data, including those from

national sources. This is particularly important where UNIDO (2011) production data are missing. In any case, industrial performance as measured by these 'macro' data are only really significant for the case selection stage, in order to depict the extent to which paired cases are characterised by divergence; my substantive focus throughout the case studies is on the mechanisms described above, and the wider factors driving changes in governance structures.

6.2.3 Goals of case studies with respect to research questions

To recap, the research questions pertaining to this stage of the analysis were defined as follows:

RQ 2. To what extent and how have LCRs contributed to performance outcomes through the causal mechanisms of FDI and developments in value chain governance?

- RQ 2.1. To what extent and how have LCRs contributed to post-liberalisation performance outcomes through cumulative processes arising in the LCRs period?
- RQ 2.2. How have the contributions of LCRs differed according to the contexts in which they were implemented?

RQ 3. To what extent and how has the elimination of LCRs contributed to performance outcomes through the causal mechanisms of FDI and developments in value chain governance?

- RQ 3.1. How have the contributions of the elimination of LCRs differed according to the contexts in which elimination occurred?
- RQ 3.2. To what extent has the elimination of LCRs precluded the promotion of local parts and components production through alternative policy instruments, and what are the implications for analyse of the elimination of LCRs?

As I discussed previously, and reflected in the research questions, the case studies incorporate within-case and comparative, cross-case elements of analysis. As the questions suggest, I am concerned with tracing performance outcomes and causal mechanisms in periods which correspond to the pre- and post-treatment periods defined in the previous chapter. However, whereas the panel ran from 1995-2011, the use of national and secondary data sources permit analysis of LCRs and parts and components sector outcomes in years prior to 1995.

RQ2 pertains to the periods in which LCRs were in force. The overall aim is to examine the mechanisms through which LCRs have contributed to performance outcomes. RQ2.1 examines evidence for the presence of cumulative causation arising from the implementation of LCRs, whether positive or negative. In order to confirm the presence of 'virtuous' cumulative impacts, we are looking for evidence that firms have engaged in technological learning and achieved greater economies of scale as a result of LCRs, the effects of which continue to act subsequent to the elimination of LCRs, and that these positive impacts have outweighed any discouragement of investment in the terminal sector, reduced incentives to export (for parts and assembly sectors), and reorientation of productive and technological activity to maximise protective rents arising from the limited domestic market. In order to confirm the presence of 'vicious' cumulative effects in the negative cases, we are looking for evidence that the negative effects, described above, predominate, such that with the removal of protection such as LCRs, existing capabilities were insufficiently developed to enable firms to adjust to the influx of competition or take advantage of increased market access abroad.

The sub-question is addressed with reference to a combination of primary data on performance outcomes and secondary data on causal mechanisms, sources of which are discussed below. The focus is primarily on within-case analysis. RQ2.2 has an explicitly comparative focus. Through within-case comparison, the aim is to identify similarities in the causal mechanisms at play in the relationship between LCRs and performance outcomes. Through cross-case comparison, the aim is to assess the extent to which diverse case-specific outcomes are determined by the conjunction

of LCRs with varied location-specific advantages. This involves comparison of market conditions, industrial capabilities, and wider policy and institutional environments prevailing during the period in which LCRs were in force.

RQ 3 pertains to periods following the elimination of LCRs, and again, the aim is to examine the mechanisms through which the elimination of LCRs has contributed to performance outcomes, through an examination of a combination of primary and secondary data, especially in relation to investment patterns and development in value chain governance.

RQ 3.1, like RQ2.3, is more explicitly comparative, the aim being to identify similarities and differences with respect to the causal mechanisms driving changes in performance outcomes that have occurred in conjunction with the elimination of LCRs. The identification of similarities permits analytical generalisation of within-case analysis, while the cross-case focus relates to the pairwise comparison of countries with largely similar structural characteristics, the divergent performance of which can be attributed to specific differences in location-specific advantages.

Finally, RQ 3.2 considers the possibility that although the elimination of LCRs have been an historically important industrial policy instrument in the automotive sector, there are a number of different ways that governments can (and do) continue to promote local parts and component production, which need to be considered as influences on the causal mechanisms and performance outcomes under examination. These policies include tariffs applied at the national and regional levels, investment performance requirements not subject to discipline under the TRIMs Agreement, and content policies applied at the regional level, for example. In addition, local content policies may be applied informally in contravention to WTO rules. Therefore, it is essential to situate the elimination of LCRs in the wider policy and institutional context in which it has taken place in each case, in order to assess the significance of the policy shift. Again, this sub-question has a within-case focus, and relies on analysis of secondary data on the strategic responses of lead firms and suppliers to government policies.

6.2.4 Case selection and comparative approach

Following the conceptual and theoretical framework developed in chapter 3, the role of regional trade agreements is so important in the determination of industrial performance in the automotive sector, that the comparison of countries from different regions or different types of regional institutional configuration is extremely problematic. To repeat, and at the risk of simplification, regional institutional configurations in the emerging markets examined here may be defined as integrated peripheral markets (IPMs), emerging regional markets (ERMs), or protected autonomous markets (PAMs). In addition, it could be argued that there are a number of countries in which the automotive sector is not subject to any substantial intra-regional trade integration nor substantial levels of trade protection (e.g., Chile and Ukraine) which we might term liberal markets.

There may be important qualitative differences between these configurations in terms of their prospects for integration into global automotive production networks that have obvious implications for parts and components sector outcomes. In addition, to the extent that members of the same regional configuration are presented the same opportunities in terms of access to the regional market, comparison of performance outcomes between them is likely to facilitate the identification of pairs according to the method of difference.

Among the population of 16 countries, there are two countries, Mexico and Romania, which are part of integrated peripheral markets (NAFTA and the EU, respectively). Emerging regional markets of account for a large number of the population – Argentina and Brazil in Mercosur; and Indonesia, Malaysia, the Philippines, Thailand and Vietnam in ASEAN. The remaining countries

(Chile, China, India, Pakistan, South Africa, Taiwan and Ukraine) are those in which automotive strategies are not characterised by their regional nature.

The two countries within IPMs vary massively in terms of size, and additionally, occupy a qualitatively distinct institutional configurations (the EU and NAFTA), so I discount a paired case comparison between Mexico and Romania. On the other hand, the other categories of regional institutional configurations have at least two potential cases to examine, enabling pairwise comparisons within them.

In order to identify potential suitable pairwise comparisons within the remaining regional configurations, I compare some basic indicators of structural characteristics – namely population, GDP, GDP per capita, mean CIP index, vehicle stock, number of vehicles per thousand persons, annual % growth in vehicle sales, and mean tariffs on vehicles – as well as indicators of performance outcomes. The latter are based on the ratio indicators of parts and components sector performance analysed in the previous chapter[64]. I compare the mean values of these indicators for the period 2002-2011, and the difference between these values and the mean values of the indicators for the period 1995-2001. In other words, I compare outcome levels in a period roughly equating to the post-treatment period, and their change from the pre-treatment period. These data are provided in appendices 17 and 18. Having identified three of potential pairs of cases within three separate regional institutional configurations, I now briefly review their performance indicators over time in order to clarify the extent to which the pairs and regions exhibit divergent outcomes following the elimination of LCRs.

[64] The indicators are the ratio of local content to apparent consumption, the output specialisation index, the export specialisation / RCA index, trade balance as a proportion of GDP, and the ratio of exports to trade.

6.2.4.1 ASEAN: Malaysia and Thailand

Within ASEAN, Malaysia and Thailand are obvious candidates and most closely resemble an ideal typical comparison within my population of cases. The cases have similarly-sized markets and levels of industrial capabilities, but diverge significantly with respect to industrial performance outcomes, with Thailand more successful in all key aspects.

Data on output and local content are not comprehensively available for Malaysia and Thailand. However, the data in table 6-1 clearly show a tendency towards divergence between the two countries in terms of local content and output. In Malaysia, there was only a modest increase in output between 2001 and 2006, and the ratio of local content to apparent consumption of parts and components fell dramatically. In Thailand, the decade 1996-2006 saw an approximately 150% increase in output, and the proportion of local content in consumption of parts and components increased from 55% to 73%.

Table 6-1: Indicators of output and local content: Malaysia and Thailand, selected years

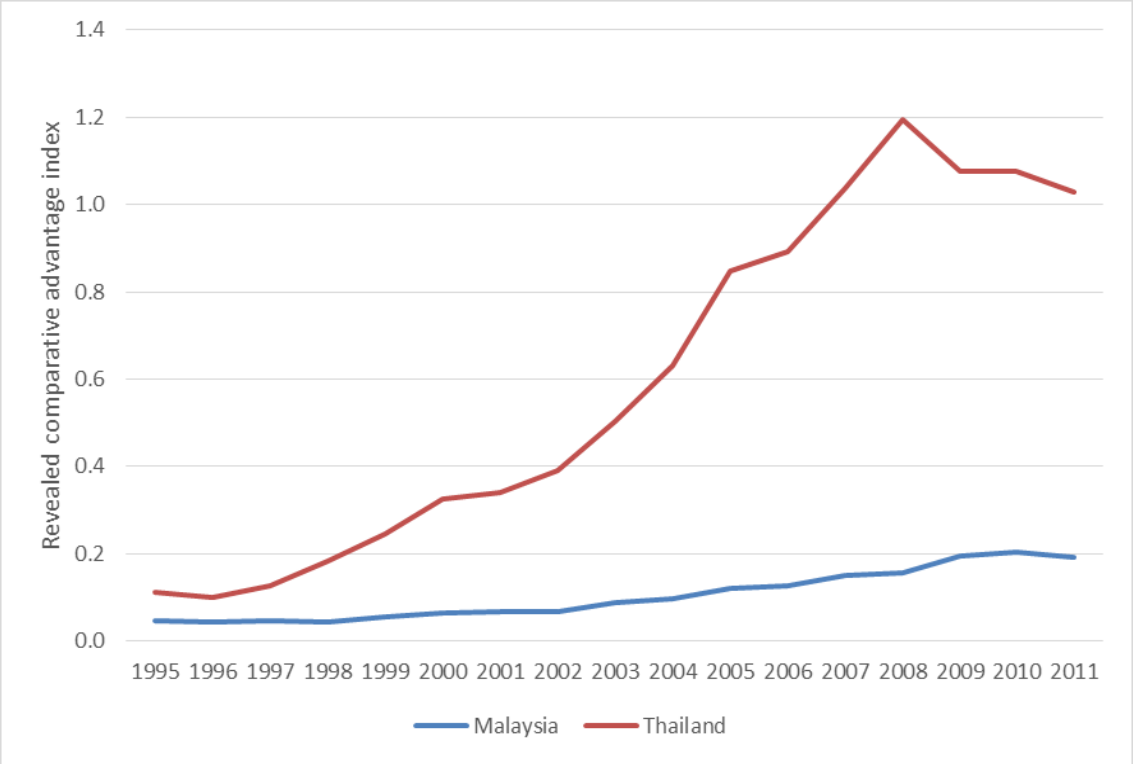
	Malaysia				Thailand			
Year	**App. cons., millions of constant 1995 USD**	**Local content, millions of constant 1995 USD**	**Local content ratio (%)**	**Output, millions of constant 1995 USD**	**App. cons., millions of constant 1995 USD**	**Local content, millions of constant 1995 USD**	**Local content ratio (%)**	**Output, millions of constant 1995 USD**
1996	-	-	-	-	5180	2810	55	2960
2001	1000	696	71	824	-	-	-	-
2006	1660	767	47	1120	7640	5090	73	7460

Source: author's calculations based on UNIDO (2011) data. Data converted to constant USD using World Bank (2011) WDI exchange rate data and U.S. Bureau of Labor (2015) inflation data.

Trade performance data exhibit a similar level of divergence. Both countries' exports have increased in absolute terms, as shown in appendices 19 and 20, as well as in ratio indicators (RCA and as a proportion of world exports), but at very different rates, leading to a more pronounced divergence in performance outcomes by the end of the period under examination. In 1995, both countries only accounted for tiny proportions of global exports (0.07 and 0.12% for Malaysia and Thailand respectively). By 2011, the figure had grown by around three and a half times for Malaysia, but by over ten times for Thailand. Based on the revealed comparative advantage index, which indicates sectoral export performance in relation to the magnitude of total exports, again both countries have exhibited increases, but Thailand's improvement has been much more pronounced and was already underway during the period in which LCRs were in effect, as shown in figure 6-1 below.

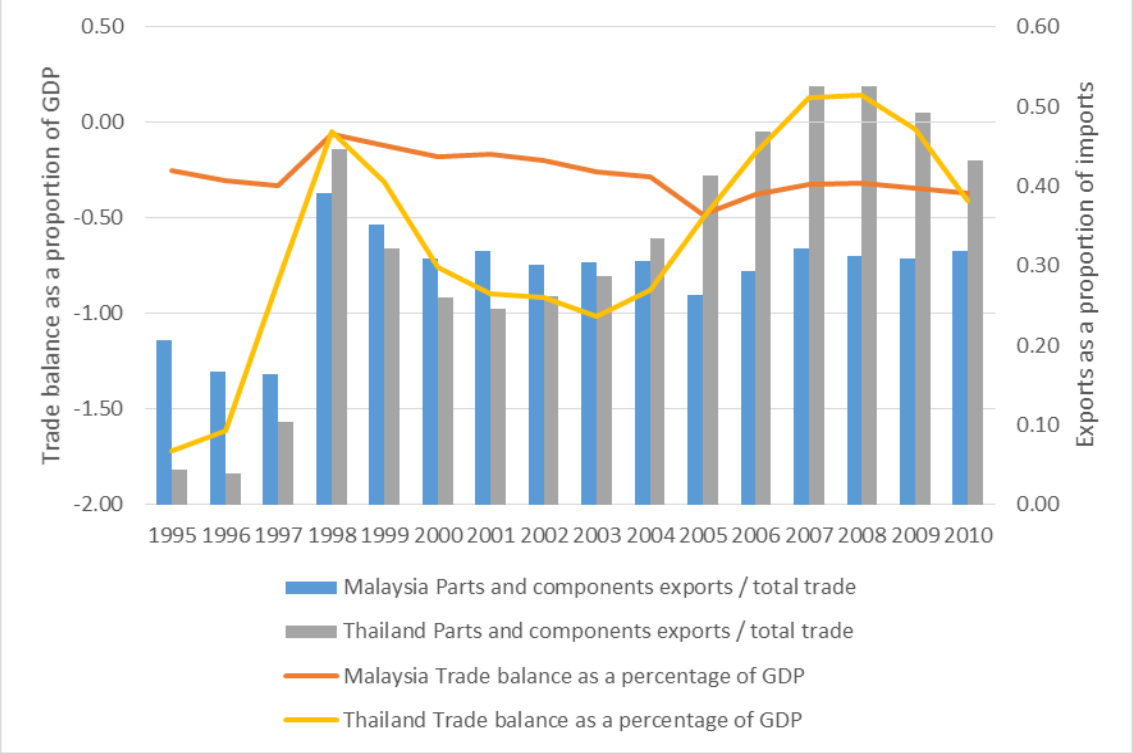
Turning to trade balances, Malaysia has established increasingly large deficits in both the assembly and supply subsector. Thailand, which has been established as an assembly hub (as described below) opened up a deficit in parts and components trade – especially in the years immediately following LCR liberalisation – but this was turned into a surplus in the second half of the 2000s, and is dwarfed by a large surplus in vehicles, exports of which themselves include a high proportion of local content. Trade balance indicators for the parts and component sector are shown in figure 6-2 below.

Figure 6-1: Revealed comparative advantage index, parts and components (SITC 784): Thailand and Malaysia, 1995-2011.



Source: author's calculations based on WITS (2015) data.

Figure 6-2: Trade balance indicators, parts and components sector (SITC 784): Malaysia and Thailand, 1995-2010



Source: author's calculations based on WITS (2015) and World Bank (2011) data.

It is instructive to compare Malaysia and Thailand in relation to intra- and extra-ASEAN trade. As shown in table 6-2, below, Malaysia relies more heavily on the protected ASEAN market than

Thailand for exports, which also serves global markets; Thailand also imports a much smaller proportion of its total imports from regional competitors, signifying its dominance of regional supply.

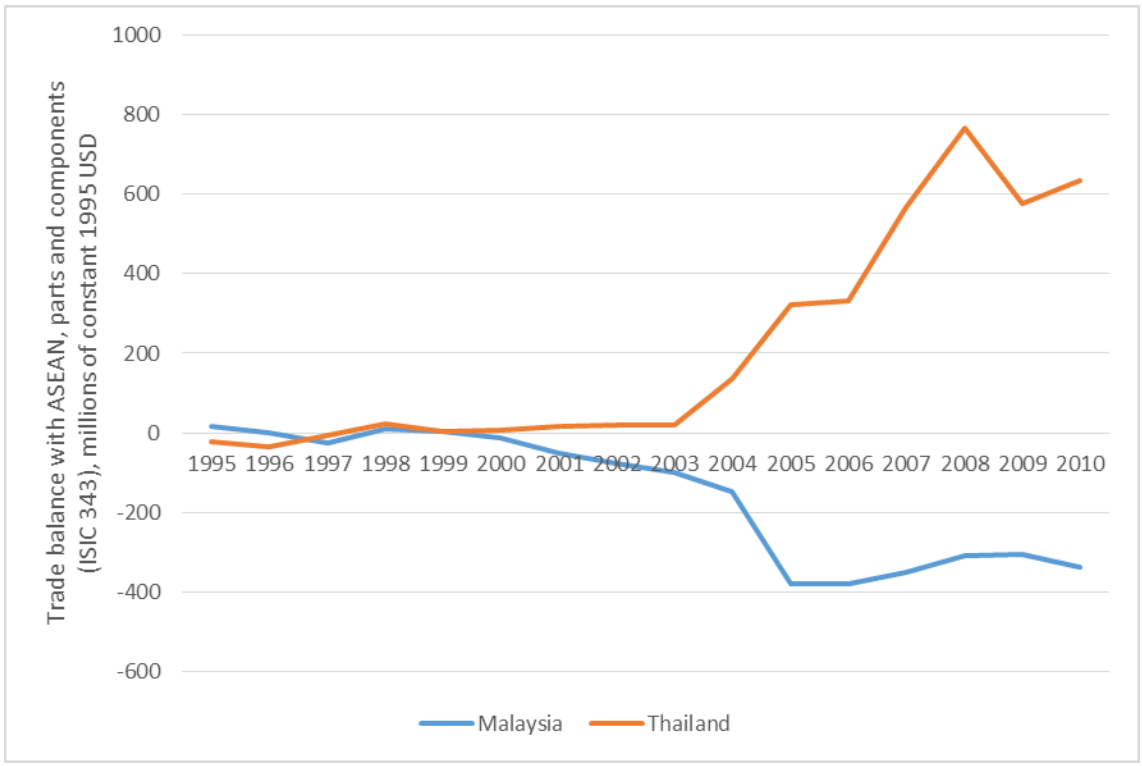
Table 6-2: Percentage of intra-regional (ASEAN) trade in total trade, parts and components sector (ISIC 343): Malaysia and Thailand, selected years.

	Malaysia		Thailand	
	Proportion of intra-regional exports in total exports	**Proportion of intra-regional imports in total imports**	**Proportion of intra-regional exports in total exports**	**Proportion of intra-regional imports in total imports**
1995	60	9	33	4
2000	40	18	25	8
2005	46	56	35	14
2010	46	46	38	16

Source: author's calculations based on WITS (2015) data.

Thailand has taken advantage of regional integration to gain large trade surpluses in parts, as shown in figure 6-3 below, as well as vehicles, while Malaysia is relatively uncompetitive even in the protected regional market.

Figure 6-3: Trade balance with ASEAN region, parts and components sector (ISIC 343): Malaysia and Thailand, 1995-2010



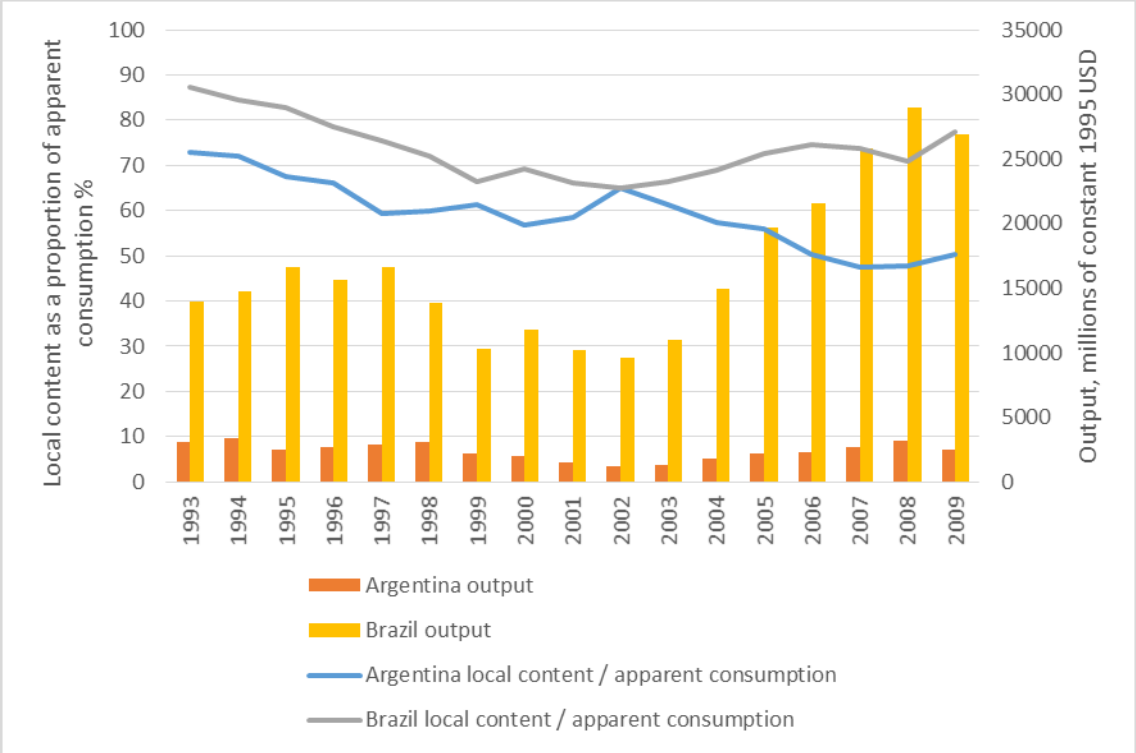
Source: author's calculations based on WITS (2015) data. Data converted to constant USD using World Bank (2011) WDI exchange rate data and U.S. Bureau of Labor (2015) inflation data.

6.2.4.2 Mercosur: Argentina and Brazil

Within Mercosur, Argentina and Brazil differ with respect to industrial capabilities and market size. Argentina is also a more mature market, with higher motorisation and income levels. They are also more closely matched in terms of key performance outcomes, but there are some clear signs that Brazil appears to be emerging as the dominant player in the regional market.

In both countries, output fell considerably during the economic crises of 1997 – 2002, as shown in figure 6-4 below. These phenomena occurred in the temporal context of ongoing processes of liberalisation and regionalisation, as well as the periods in which prohibited LCRs were in force (1995 until the end of 1999 in Brazil; until 2004 in Argentina). Turning to local content as a proportion of apparent consumption, also shown in figure 6-4 below, this declined in both countries during the 1990s, during which time LCRs were in force. However, in Brazil the local content ratio has levelled off and indeed risen since 2002, while in Argentina, it has continued to decline during the same period after a brief period in which imports fell sharply during the severe recession.

Figure 6-4: Output, millions of constant 1995 USD, and local content as a proportion of apparent consumption, %: Argentina and Brazil, 1993-2009

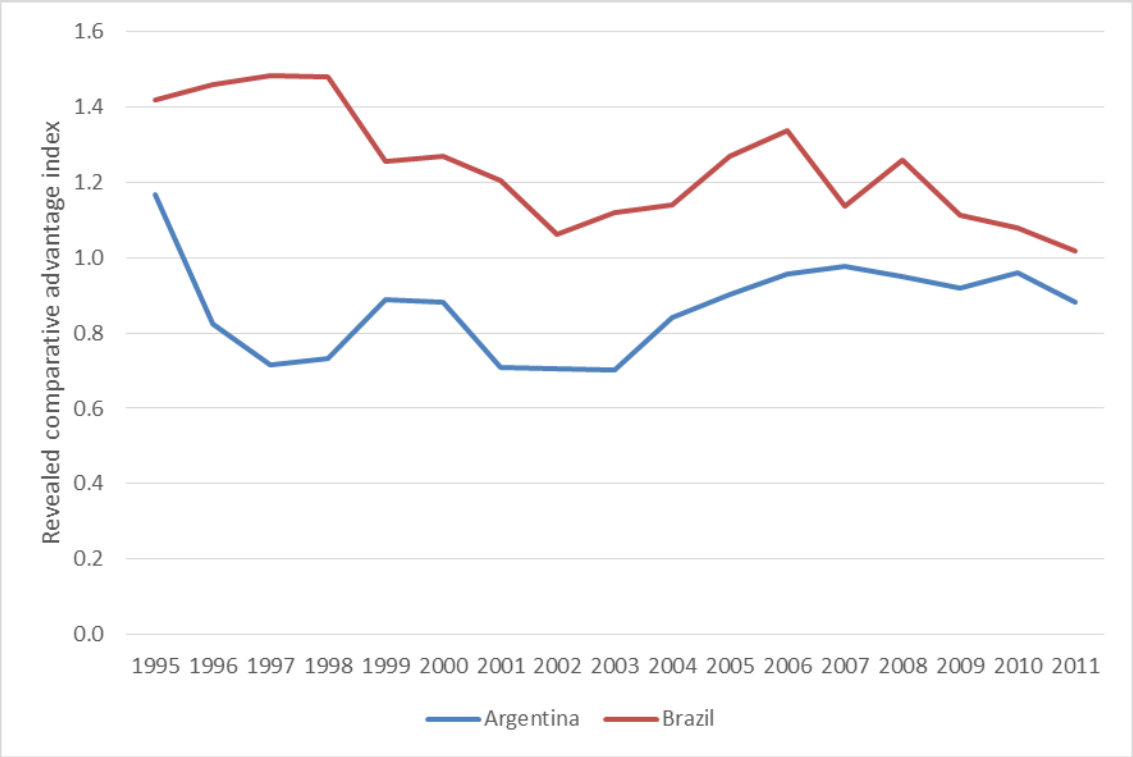


Sources: author's calculations based on CEP (2015) and Sindipeças / Abipeças (2011). Data converted to constant USD using U.S. Bureau of Labor (2015) CPI statistics. Note: Sindipeças / Abipeças (2011) sales data appear to include exports but not imports, and therefore are equivalent to output. Local content is calculated by subtracting exports from sales, and apparent consumption is calculated by adding imports to local content.

As shown in appendices 21 and 22, in absolute and constant terms, both exports and imports have followed an upward trend, except during the periods of macroeconomic crisis. Data on country exports as a percentage of world exports, shows that globally, both countries are fairly small players, with Argentina accounting for between 0.28 and 0.48% of world exports, and Brazil between 1.01 and 1.57%. For both countries, these ratios dropped significantly during the period 1999-2002 and have since risen. Figure 6-5 shows the revealed comparative advantage (RCA) index for both countries for the parts and components sector. The index initially exceeded unity,

indicating that the ratio of parts and components exports to total exports was higher than the ratio of global parts and components to total global exports. In other words, Argentina and Brazil were relatively specialised in this particular sector. Despite an overall decline, this figure has remained comparatively high.

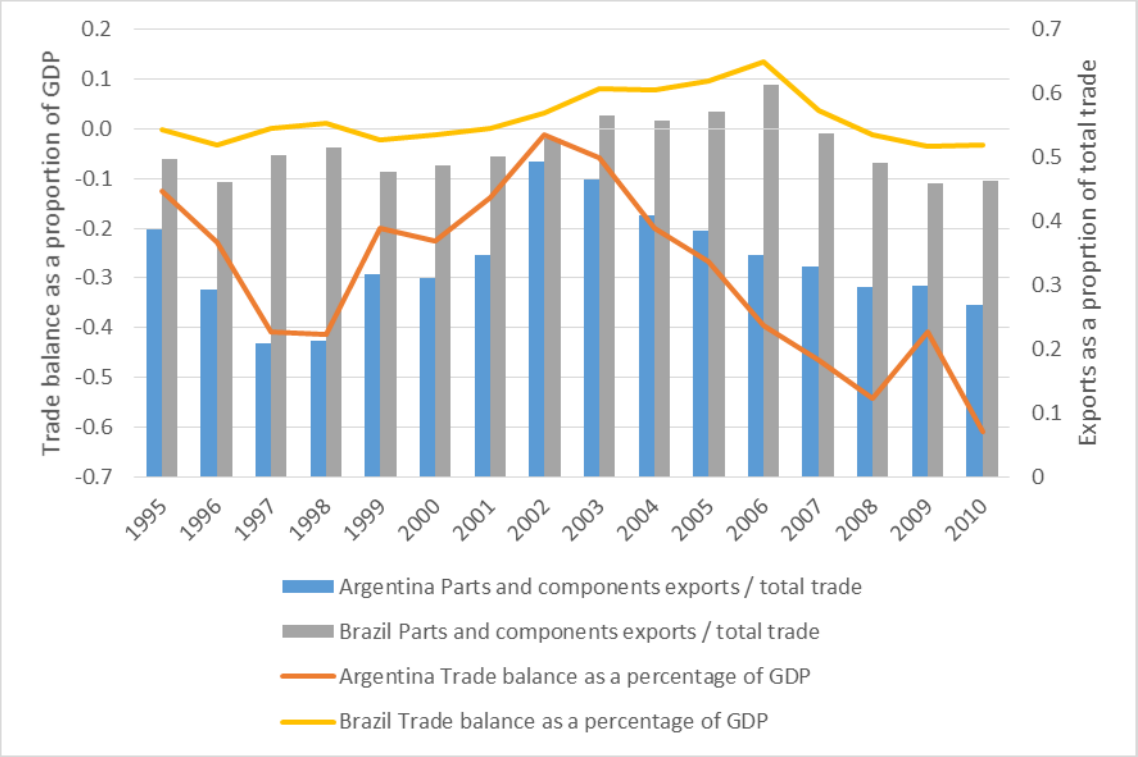
Figure 6-5: Revealed comparative advantage index, parts and components (SITC 784): Argentina and Brazil, 1995-2011.



Source: author's calculations based on WITS (2015) data.

As shown in figure 6-6, below, trade balance statistics make clear that both countries have fared very differently in the post-LCRs era. Brazil has exhibited a consistently higher ratio of exports to total parts and components trade, and has achieved a trade surplus between 2001 and 2007, although it is difficult to separate this from the effects of currency devaluation during this period, which made Brazilian exports more competitive. As a proportion of GDP, trade balance has been consistently negative in Argentina, only reducing during the economic crisis of 2002, when domestic demand for imports collapsed.

Figure 6-6: Trade balance indicators, parts and components sector (SITC 784): Argentina and Brazil, 1995-2010



Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Since within the countries of the Mercosur region a large proportion of trade is intra-regional – as shown in table 6-3, below – it is worth looking at intra-regional trade specifically for a more nuanced understanding of trade performance in Argentina and Brazil.

Table 6-3: Percentage of intra-regional (Mercosur) trade in total trade, parts and components sector: Argentina and Brazil, selected years.

	Argentina		**Brazil**	
	Exports	**Imports**	**Exports**	**Imports**
1995	80	54	28	24
2000	51	33	22	14
2005	51	40	15	14
2010	65	55	43	14

Source: author's calculations based on WITS (2015) data.

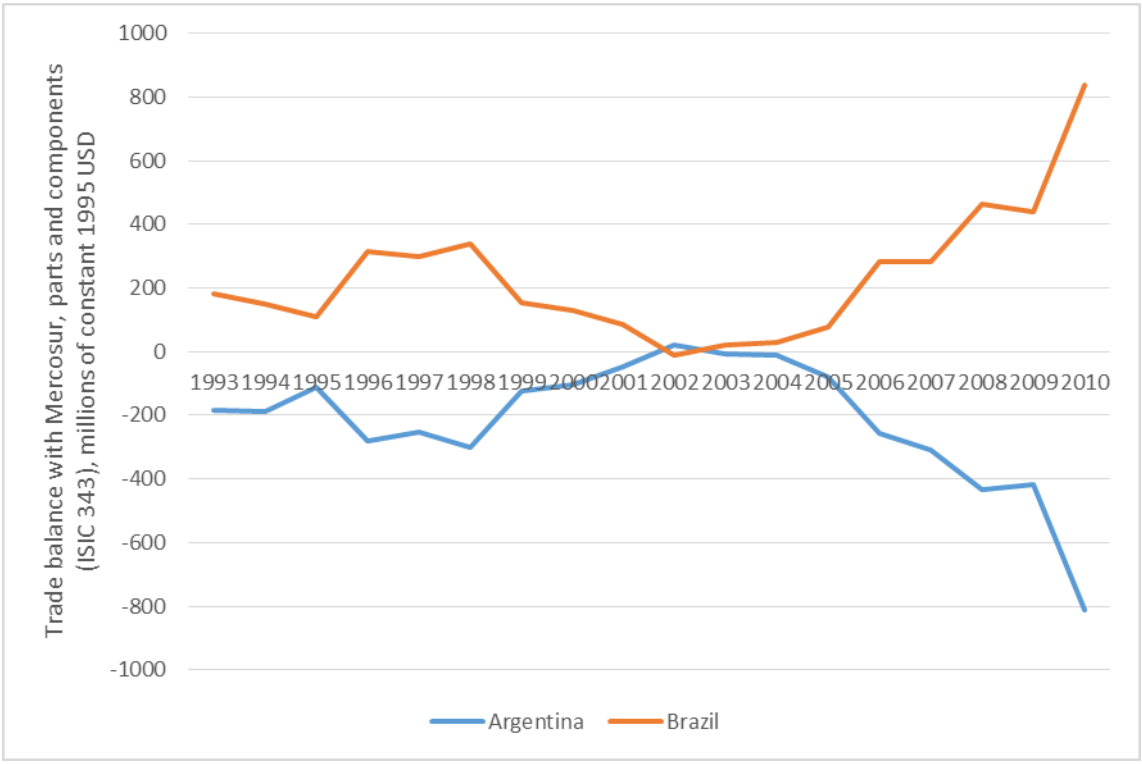
For both countries, the regional market is a more important destination for exports than it is a source of imports. This suggests that opportunities afforded by the protected regional market are important in the context of Mercosur and domestic firms and subsidiaries take advantage of protection to engage in intra-regional trade; if exporting firms were competitive in global markets, we would not expect to see such a discrepancy.

There are, however, differences between the two countries in this regard. Argentina has significantly higher levels of intra-regional imports and exports as proportions of their respective global totals than Brazil. As Laplane and Sarti (2004: 134) point out, it is to be expected, given their respective national market sizes, that "Argentina's production and trade are more dependent upon the Brazilian market than the opposite… export growth was mostly linked to the opening up of the Brazilian market and resulted from the compensated trade requirements". As a

result, Brazil does a far greater proportion of its trade with third parties. In a way, it could be said that Argentina is threatened by global *and* regional competitors, whereas for Brazil, the only real competitive threat has come from outside Mercosur.

It is possible to witness this phenomenon in the data on intra-regional trade balances. Initially, a regional division of labour was established, in which Brazil exported parts and imported vehicles; but through the course of the 2000s, Argentina has opened up a trade deficit in both subsectors, despite efforts to establish balanced trade within the context of exceptions to intra-regional free trade. Data for the intra-regional trade balance in the parts and components sector are shown in figure 6-7, below. Argentina's deficit was only temporarily reversed during its economic crisis, when – as discussed above – imports fell rapidly. Since then, the deficit has grown rapidly. In summary, the trade data suggest that Brazil has had more notable success in regional and global markets than Argentina; this pertains specifically to the parts and components subsector as well as the automotive sector more broadly.

Figure 6-7: Trade balance with Mercosur region, parts and components sector (ISIC 343): Argentina and Brazil, 1993-2010



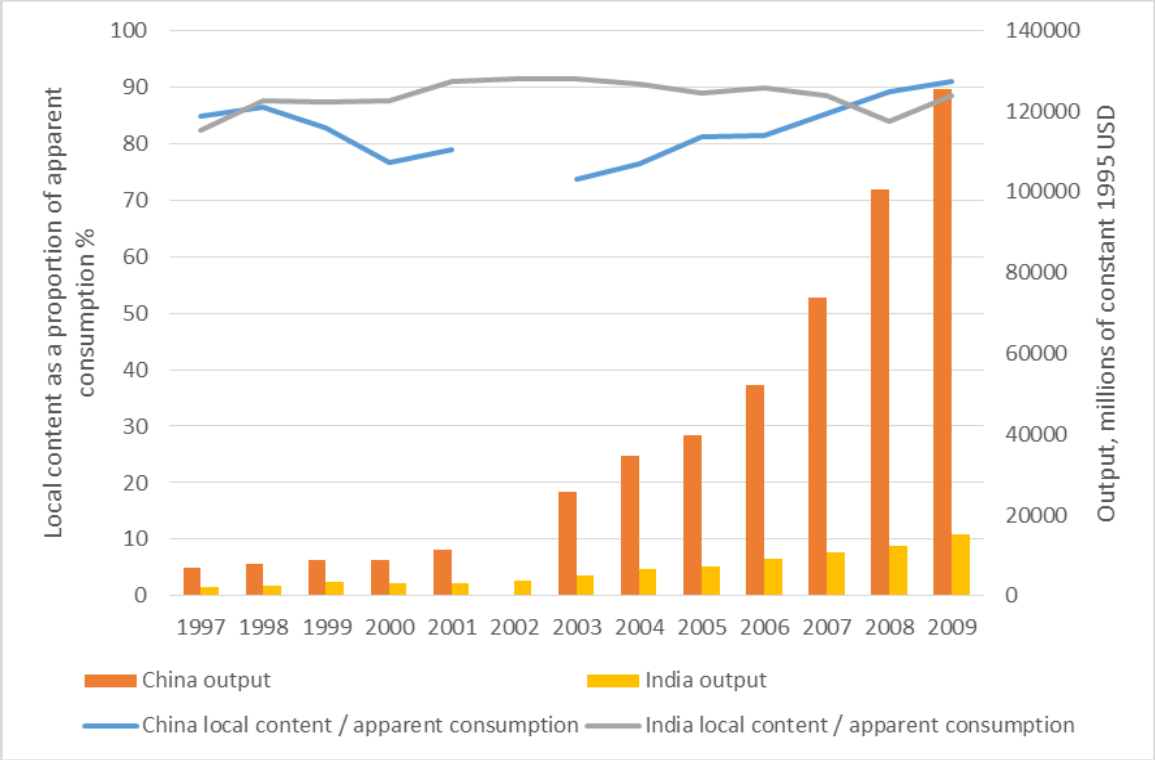
Source: author's calculations based on WITS (2015) data. Data converted to constant USD using World Bank (2011) WDI exchange rate data and U.S. Bureau of Labor (2015) inflation data.

6.2.4.3 Protected autonomous markets: China and India

Finally, the PAMs are a diverse group, within which the most obvious similarities are between the continentally-sized Asian giants China and India. China has a larger market and more advanced capabilities, and although performance outcomes are similar, based on the data presented above, further examination shows that China out-performs India in a number of respects. Humphrey et al. (2000) suggest that these countries have had the best chance of establishing independent automotive sector as a result of their immense (potential) markets and historic support for national automotive firms, which make them an interesting contrast with the previously discussed pairs, which have followed regional integration as a means to expand and preserve their automotive spaces (ibid.).

As shown in figure 6-8, below, both China and India have exhibited remarkable rates of growth in output, both in the period prior to and post-elimination of LCRs; however, Chinese production levels have outstripped India performance by some magnitude. Throughout the period under examination, both countries have also retained very high local content ratios.

Figure 6-8: Output, millions of constant 1995 USD, and local content as a proportion of apparent consumption, %: China and India, 1997-2009

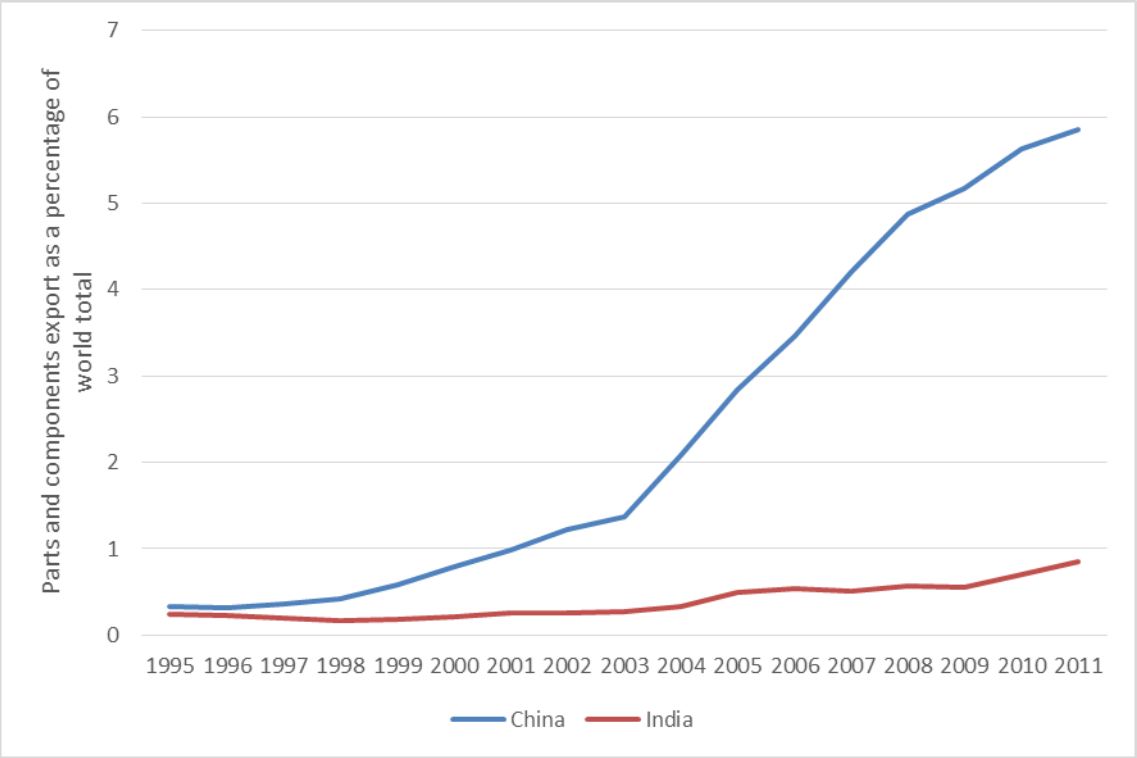


Source: Compiled by the author with data from UNIDO (2011) and Sutton (2005). Data converted to constant USD using World Bank (2011) WDI exchange rate data and U.S. Bureau of Labor (2015) inflation data. Note: data for available for China in 2002.

As shown for the parts and components subsector in appendices 23 and 24, imports and exports have both increased across all automotive subsectors – in some cases dramatically. Looking more specifically at export performance indicators for the parts and components sector, in absolute terms, China has performed much more successfully than India since 1995, as shown in figure 6-9 below. In 1995, China accounted for 0.34% of total global parts exports classification, while India captured 0.25%. While the shares of each have grown, China now accounts for almost 6% of global parts exports in comparison to India with less than 1%. Similarly, the revealed comparative advantage index (which normalises sectoral exports by total merchandise exports) shows that while both countries are more specialised in parts and components exports than they were in

1995, China has exhibited a more rapid and remarkable transformation than India, which had a much higher RCA to begin with. It is also notable that between 1995 and 2001, the period during which LCRs were in effect, saw the Chinese RCA index rise from 0.11 to 0.23, whereas India's fell. Indian export performance growth has only really started since the elimination of LCRs, whereas China's improvement is apparent from 1995, although more rapid since 2002-3.

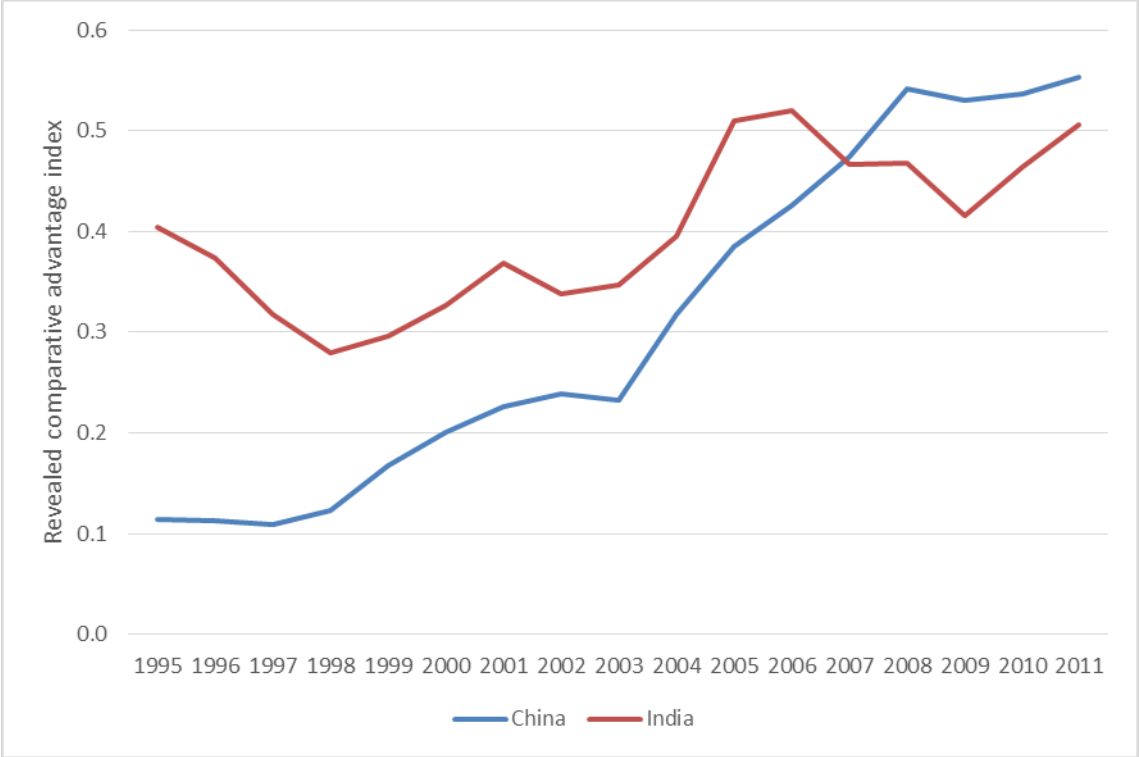
Figure 6-9: parts and components exports as a percentage of world exports (SITC 784): China and India, 1995-2011.



Source: author's calculations based on WITS (2015) data.

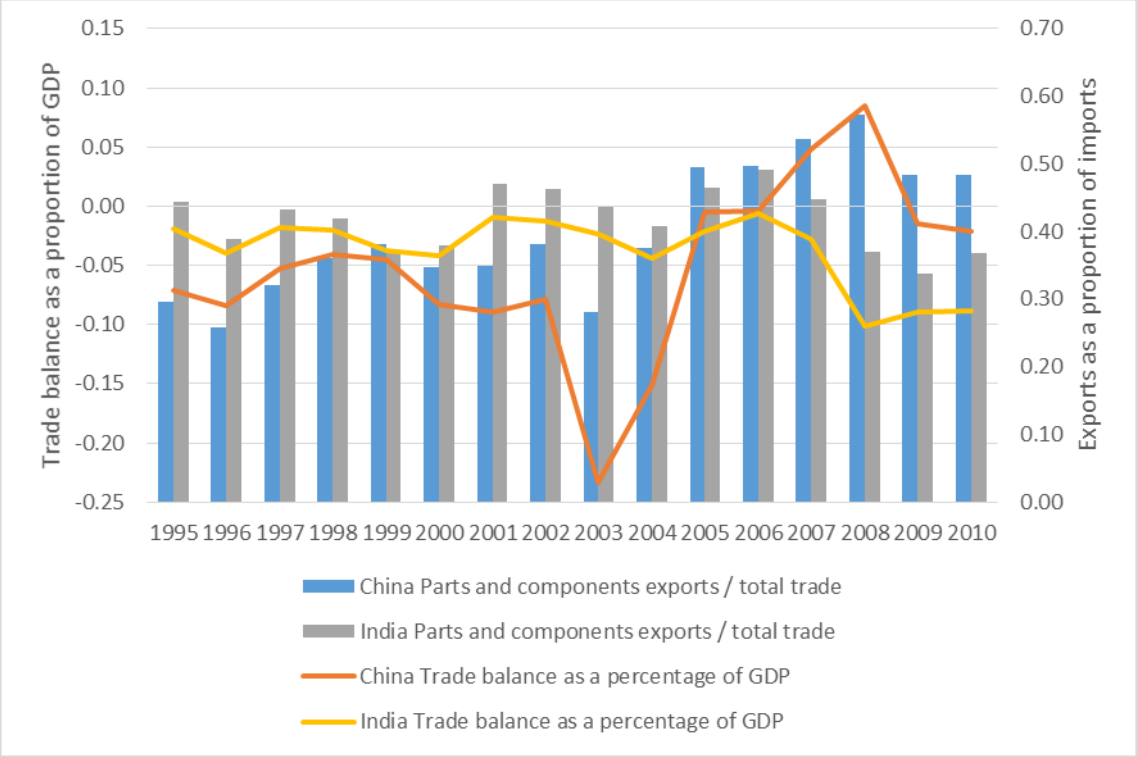
Turning to data on trade balances, which take into account changes in exports and imports, China has developed a trade deficit for the automotive sector as a whole exceeding 7 billion USD in constant 1995 terms, whereas India has a surplus of approximately 1 billion. China and India specialise in exporting different 'segments' of the automotive sector. In China, exports of finished vehicles are negligible in comparison to imports, and to exports of parts. The converse is true in India, which maintains a trade surplus in vehicles but towards the end of the 2000s, has established a deficit in the parts and components sector.

Figure 6-10: Revealed comparative advantage index, parts and components (SITC 784): China and India, 1995-2011.



Source: author's calculations based on WITS (2015) data.

Figure 6-11: Trade balance indicators, parts and components sector (SITC 784): China and India, 1995-2010



Source: author's calculations based on WITS (2015) and World Bank (2011) data.

To summarise, both China and India have exhibited impressive rates of growth in production and trade; high local content ratios have been maintained and export performance indicators have improved in both cases. There are significant differences in the magnitude of production levels and trade flows, reflecting the relative size of each market – China has rapidly become the largest automotive market in the world by a long distance, while India's market is still limited at approximately one fifth the size. China's recent parts and component sector trade performance has been impressive in relation to India's, although it must be noted that India has achieved some success exporting vehicles, whereas China's huge assembly sector is devoted almost entirely to servicing the domestic market; China has also developed a large trade deficit in vehicles.

6.2.5 Structure of paired comparisons

My case selection process has led to the identification of three pairs of cases: Argentina and Brazil, China and India, and Malaysia and Thailand. As well as providing opportunities for paired comparisons based on the method of difference – and thus, identify 'difference-makers' that interact with LCR liberalisation to produce divergent impacts – my selections are justified in two further ways. Firstly, I am minded to cover a number of cases, in order to enhance analytical generalisation about the impacts of the elimination of LCRs across the wider population and also to enhance the opportunities for obtaining secondary data pertaining directly to my research questions. Secondly, the strategy enables me to identify similarities and differences in the causal mechanisms that exist across a wide variety of regional institutional configurations, and the opportunities that exist for promotion of localisation and integration into global production networks within each of them. The remainder of the chapter comprises the three paired case-studies. Sections 6.3, 6.4 and 6.5 cover Malaysia and Thailand, Argentina and Brazil, and China and India, respectively.

The structure of each paired case comparison is as follows. After briefly introducing the logic of examining each pair and the implications of each, I provide a broad historical overview of the automotive sector, outlining the policies and institutions that have served to foster domestic parts and components production, and influenced performance outcomes in terms of trade, investment, ownership and governance structures. This leads onto an examination of the context in which LCRs have been embedded in the post-1995 period, leading up to their elimination under WTO rules. I explore secondary data sources on their effects on governance structures and performance outcomes. In the following section, I describe the manner in which LCRs have been phased out, including a detailed examination of mitigating factors influencing performance outcomes. In the next section, I examine the causal mechanisms through which performance outcomes are manifest, namely the patterns of FDI and value chain governance structures that have emerged in response to the developments described in previous sections, in which the implementation and elimination of LCRs are situated. A final section concludes and addresses my research questions in the case of each paired comparison, which are then synthesised in the following chapter.

6.3 MALAYSIA AND THAILAND

6.3.1 Overview

As discussed previously, the comparison between Malaysia and Thailand provides the best opportunity to compare the implementation and elimination of LCRs in conjunction with divergent conditions according to the logic of the method of difference. It could be argued that Malaysia and Thailand have offered similar potential as automotive markets for several decades. As 'second-tier Tigers', rates of economic growth have been high (if volatile) since the 1960s. Malaysia is richer, with per capita incomes between around one and a half and two times larger, according to World Bank (2011) data. In terms of population, Thailand is approximate twice the size of Malaysia, and indeed GDP in absolute terms is of roughly equal magnitude. Turning to domestic automotive demand, Malaysia's market is more mature, with 289 motor vehicles per thousand people in 2005, compared to 146 in Thailand (World Bank, 2011); differences in vehicle ownership were already established by the early 1990s (Doner, 1991). Therefore, Malaysia's smaller population and high initial levels of motorisation suggest less scope for growth, and indeed, average sales growth rates reflect this. Nevertheless, the countries have been (until recently) remarkably well-matched in terms of their overall size and potential, a fact aided by their geographic proximity and status as partners in the ASEAN regional project.

Amidst these considerable similarities, however, Malaysia and Thailand have diverged with respect to policies affecting local and foreign automakers, with the result that Thailand has emerged as a regional and global commercial vehicle hub for MNCs that have largely eschewed investment in Malaysia. This has had knock-on effects for suppliers, and for the effectiveness of policies designed to encourage local supply.

Thus, throughout the 1990s, LCRs in Thailand have not discouraged MNCs, which have been keen to establish assembly operations in pursuit of protective rents in the rapidly growing domestic market for pick-up trucks as well as access to the forthcoming ASEAN free trade area; and indeed, have encouraged a wave of Japanese suppliers to invest heavily in the parts and components sector. Upgrading and technology transfer were necessitated by the orientation of assemblers towards export markets, which was assisted, in turn, by a slowdown in domestic demand that occurred as a result of the Asian financial crisis. In contrast, where LCRs were implemented in conjunction with policies favouring uncompetitive national assemblers, as in Malaysia, they merely served to insulate parts suppliers from competition while circumventing technology transfer from MNCs.

Arguably then, LCRs have had divergent and cumulative effects, which have determined the context in which subsequent elimination of LCRs took place. Malaysia has been compelled to liberalise its uncompetitive parts sector at a time when neighbouring Thailand is well established as the favoured destination. In fact, Malaysia has resisted liberalisation and has continued to protect the automotive sector through a variety of means; but it seems that the establishment of a competitive parts and components sector has been foreclosed, at least for the foreseeable future, and the inefficient network of suppliers that have been fostered under LCRs continue to act as a drag on the development of the vehicle sector in the more liberal environment.

6.3.2 Localisation policies in the historical context of automotive sector development

6.3.2.1 Import substitution and the role of Japanese FDI: 1960s – 1980s

In both Malaysia and Thailand, the automotive industry first emerged as a result of concerted industrial policies in the 1960s (Busser, 2008; Athukorala and Kohpaiboon, 2010). The strategy for both countries was to court chiefly Japanese carmakers – noted for their preference for serving foreign markets through exports rather than FDI and local production – in order to access technological know-how. By 1984, Japanese firms held a combined market share of approximately 80% and 90% in Malaysia and Thailand respectively as shown in table 6-4, below.

Table 6-4: Share of automotive market by firm, percent: Malaysia and Thailand, 1984.

	Malaysia	**Thailand**
Toyota	20.7	29.2
Nissan	25.4	24.1
Mitsubishi	8.1	5.2
Mazda	9.6	7.3
Isuzu	9.2	17.7
Daihatsu	4.7	1.5
Susuki	-	1.2
Hino	1.2	3.4
Japanese total	**80.5**	**90.1**
GM	2.8	-
Ford	6.9	2.7
Mercedes	4.2	1.2
British Leyland	4.3	-
Fiat	3.1	-
Peugeot	1.1	-
Misc.	6.5	6
Non-Japanese total	**19.5**	**9.9**

Source: adapted from Doner, 1991: tables 3.12 and 3.15.

From the outset, a progressive strategy of localisation was initiated. Initially, prohibitively high tariffs on fully built vehicles were used. The second phase of localisation began in the 1970s as a response to high import propensities and a lack of integration between component manufacturers and assemblers in the context of low or negative effective rates of protection for intermediates. Local content and trade balancing requirements, mandatory deletion provisions and other measures were introduced. In Malaysia, local content requirements were raised from 10% in 1970 to 35% by 1982. Similarly, Thailand increased the requirement from 15-25% (dependent on vehicle type) in 1971 to 50% in 1978 (Doner, 1991).

Under import substitution, automotive production rose steadily in both countries: to over 100,000 in Malaysia, and around 86,000 in Thailand, by 1981, as shown in table 6-5.

Table 6-5: Vehicle production (passenger cars and commercial vehicles), thousands of units: Malaysia and Thailand, selected years.

	Malaysia	Thailand
1965	-	10
1967	1.2	12.7
1969	25	11.7
1971	-	14.8
1973	50.4	27.4
1975	-	31
1977	-	65.9
1979	88.6	88.8
1981	111.5	86.5
1983	133.3	108.8
1985	124	81.8
1987	-	97.8

Source: adapted from Doner, 1991: table 3.10.

By the early 1980s, a degree of local content had been achieved. In Thailand, localisation policies were "moderately successful" (Doner, 1991: 47): the level of local content rising from 6-15% in 1973, to 25% in 1977, and 30-35% in 1980. Furthermore, unlike in the assembly sector, ownership was dominated during this period by local capital. Local parts and components firms at this stage even dominated the first tier original equipment supply chain in Thailand (ibid.). However, even this achievement "must be tempered by the high imported content of auto parts made in Thailand, estimated at roughly 60 percent in the early 1980s" (ibid.).

In Malaysia, localisation was arguably less of a success: Doner (ibid.: 50) reports local content ratios of 8% in 1978 rising to 18% by 1982. In addition, while the majority of parts firms were locally owned, they were dominated by the country's ethnic minority Chinese and Indian populations – an imbalance which the government subsequently sought to address in favour of the indigenous Malay population. This policy goal coloured the subsequent drive towards automotive nationalism, discussed in the following section.

To summarise, growth in production of vehicles and parts must be seen in the context of a largely fragmented industry structure that had failed to achieve international competitiveness in either country by the early 1980s. Local content rates were still low and indeed local parts and components were themselves highly import dependent. Exports were negligible until the mid-1980s and significant trade deficits were maintained throughout this period.

6.3.2.2 Divergence of national policy and institutional regimes: 1980s – mid-1990s

By the early 1980s, it had become clear that both countries had failed to achieve the objectives to which they had aspired. Local production had come at the cost of inefficiency which kept automotive products expensive and relatively poor quality; protection served to furnish foreign assemblers with rents; and trade performance was poor. A major issue for both countries was the need for rationalisation, since both countries were characterised by large number of assemblers producing relatively small volumes (Doner, 1991).

At this juncture, both countries continued with a broad strategy of import substitution which included the expanded use of LCRs, as well as prohibitively high tariffs and imports restrictions on finished vehicles and restrictions on foreign equity, throughout the 1980s. However, while the Malaysian government embarked on an ambitious attempt to produce a 'national car', the Thai government shelved plans to do the same in the early 1980s.

Thailand applied significant levels of trade protection on finished vehicles; a ban on passenger car imports was imposed from 1978 to 1991 while finished vehicle imports that were permitted were subject to tariffs ranging from 180-300%. By the late-1980s, LCRs were set at 54% for passenger cars; at the same time, assemblers of commercial vehicles – including the popular one-ton pick-up truck – were required to use locally-manufactured diesel engines, the producers of which were limited to three companies in order to promote the achievement of scale economies (Athukorala and Kohpaiboon, 2010: 3-4). Thus, by the mid-1980s, the dominant themes of subsequent Thai automotive strategy had begun to emerge: ownership restrictions were phased out[65] and inward FDI in the parts and components sector, especially from Japanese assemblers, began to be encouraged; and the commercial vehicle (specifically, pick-up) subsector began to be targeted for special incentives (Natsuda and Thoburn, 2013).

In Malaysia, localisation policies were advanced with 1980's Mandatory Deletion Programme (MDP), which prohibited "local car producers, or franchisors from importing all automotive parts and components listed as 'mandatory deleted components' for use in local automotive assembly" (Rosli and Kari, 2008: 106). Levels of tariff protection were also high for finished vehicles, although not as high as in Thailand. However, in contrast to Thailand's reliance on private capital and especially Japanese FDI, in 1983, Malaysia announced the National Car Project, which formed a joint venture – *Proton* – between the state-owned Heavy Industry Corporation of Malaysia (HICOM) and Mitsubishi. Natsuda et al. (2013) describe the Malaysian strategy as one of 'industrial nationalism'. As noted by Ravenhill and Doner (2008), the ambitious rationale for the project was the "radical rationalization of what had been a highly fragmented production structure" – the production of one model for the national market allowing the requisite levels of scale and efficiency. Proton also introduced the Vendor Development Program (VDP) to provide technological assistance to suppliers, which were rationalised to maximise economies of scale. In addition to Malaysia heavily discriminatory tariffs, the government has "provided a number of generous incentives under the Promotion of Investment Act" including tax breaks for firms with 'pioneer status' and fiscal rebates on capital investment expenditure (Rosli and Kari, 2008: 105).

In the early 1990s, Thailand began to deregulate and liberalise the automotive sector, by abolishing restrictions on domestic production of specified series and models in 1990, and drastically reducing tariffs for built-up and knocked-down vehicles in the following year[66]. Crucially, tariffs for knocked down kits for local assembly were reduced to 2%, although LCRs were maintain (Athukorala and Kohpaiboon, 2010: 26). At the same time, discretionary fiscal policy was used to promote production of pick-up trucks as a 'product champion'[67]; specifically, the rates of excise tax applicable to pick-up trucks in 1992 was reduced to 3-10%, in comparison to 41.8% for large passenger cars (ibid.: 28). These policies encouraged waves of investment and contributed to the emergence of Thailand as a global and regional production hub, as I show below.

In contrast, Malaysia did not significantly reduce rates of tariff protection on vehicles and knocked down units, and indeed increased them for some vehicle types (Natsuda et al., 2013: 133). Malaysia expanded its 'national champion' strategy, launching the second National Car Project – Perodua – in 1993, and a third, Malaysian Truck and Bus (MTB), the following year. These new projects were subject to the same provisions regarding localisation as Proton. The intention was

[65] Board of Industry (BOI) incentives initially required majority local equity except in areas with "no indigenous capacity" (Doner 1991: 46).

[66] For example, tariffs were reduced from 300 to 68% for vehicles exceeding 2,400cc engine, and from 112 to 42% for knocked down kits of the same.

[67] Since 2007 the Thai government has promoted the 'Eco Car' as its second product champion (Natsuda and Thoburn, 2013).

that the new projects "would be able to utilise Proton's vendor networks", thus reducing the "cost of parts procurement by achieving economies of scale" (ibid.: 16).

In both countries, but especially in Thailand, sales increased rapidly between 1980 and 1995, as shown in table 6-6 below (data are not available for production, but, in light of the prohibitively high trade barriers, would be similar).

Table 6-6: Vehicle sales, thousands of units: Malaysia and Thailand, selected years

	Malaysia	Thailand
1980	101	89
1985	107	86
1990	186	304
1995	285	572

Source: Athukorala and kohpaiboom (2010: 35)

By the early 1990s, Malaysian sales came to be dominated by national brands while sales in Thailand maintained a predominantly Japanese character[68]. By the mid- to late-1980s, Proton had had a degree of success; the *Saga* model had come to dominate sales of the sedan subsector. Furthermore, local content was higher than previous Malaysian-assembled vehicles (Doner, 1991: 53) and continued to rise throughout the 1980s and '90s: from 18% in 1985 to 80% in 1992 (Rosli and Kari, 2008: 108).

However, sales were artificially inflated and "depended crucially on government support though tariff protection, and other preferential treatments, including periodic capital injection on concessionary terms" (Athukorala and Kohpaiboom, 2010: 18). Thus, "state protection effectively reduced competitive pressure on local producers" (Natsuda et al., 2013: 114), delaying and discouraging technological upgrading, and thereby prolonging the conditions in which rent-seeking lobbies have thrived. The VDP, an essential component of upgrading suppliers in the context of LCRs "placed a burden on Proton, resulting in higher cost and poorer quality products" (ibid.: 20-21). According to Wad and Govindaraju (2011: 166), whereas supplier upgrading should take place in the context of technology transfer from highly capable OEMs, in the Malaysian can an "infant OEM had to upgrade itself while upgrading its suppliers, too".

Vehicle production and local content levels also rose through the 1980s in Thailand, to what is acknowledged to be the highest level of local content in the region by 1991 (Doner, 1991: 47). Whereas Malaysia's projects were almost entirely destined for the domestic market[69], Japanese automakers in receipt of incentives to produce one-ton pick-ups (namely Toyota, Nissan and Isuzu) "set up production plants in Thailand to produce for the global market" in line with "beginning of the structural shift in global auto industry" (Athukorala and Kohpaiboom, 2010: 13).

As a result, another pattern that began to emerge during this period pertains to export performance. From a low base, Thailand witnessed some modest growth in exports, while exports of both Malaysian vehicles and parts were disappointing (see table 6-7, below).

[68] As discussed below, these patterns endure today, with national brands still accounting for over half of vehicles sales in Malaysia (Natsuda and Thoburn, 2014: 1362).

[69] This was a result of intense oligopolistic competition and stringent quality standards in the global vehicle market –which Proton could simply not achieve – as well as the strategic interests of the project's Japanese joint venture partners, Mitsubishi, who sought to restrict exports that might jeopardise the company's own global sales. See, e.g., Athukorala and Kohpaiboom (2010: 19).

Table 6-7: Auto parts exports, millions of USD: Malaysia and Thailand, 1979-86.

	Malaysia	Thailand
1979	3.2	8.4
1980	2.7	9.8
1981	3.8	8.5
1982	5.4	8.6
1983	6.8	8.1
1984	4.3	9.7
1985	4.3	11.6
1986	3.6	15.0

Source: Doner, 1991: 45.

According to Techakanont (2011), one of the major reasons that auto sales and production grew so significantly in Thailand from the 1980s was a gradual appreciation of the Yen enticed Japanese investors to seek investment projects abroad. Farrell and Findlay (2001: 23) add that during the 1990s "the increasing exchange rate cost of imports from Japan" was an important contributory factor – alongside LCRs – to "a series of investments in the ASEAN region from Japanese parts and components manufacturers who relocated part of their output to the region to assist their OEM partners". The interesting point is that of the pair of countries examined here, almost all of the investment flowed into Thailand. The influx of Japanese capital into the assembly sector benefitted a swath of Thai-owned suppliers, who were able to move into the production of increasingly sophisticated parts as a result of protection afforded by LCRs (Doner, 1991: 49). Clearly, the contexts in which local content rules were implemented have been fundamentally important in determining their outcomes. Despite similar market conditions, LCRs have been situated in markedly different policy and institutional environments, leading to significantly divergent performance outcomes.

6.3.3 The elimination of LCRs and other drivers of parts and components sector performance in the post-WTO era

6.3.3.1 LCRs in the context of liberalisation, regional integration, and the Asian financial crisis: mid-1990s – 2000s

At the start of the 1990s, both Malaysia and Thailand still pursued significantly protectionist automotive regimes including localisation policies to support parts and components manufacturers, but pressures towards liberalisation were beginning to mount. Global value chain governance structures were in the midst of transformation, as discussed in chapter 3; and moves towards multilateral liberalisation and regional integration were also underway. By the early 1990s, it had become clear that the prohibition of TRIMs was likely to feature in the new global trade rules. Therefore, in the early 1990s, significant challenges were looming on the horizon. Each country's strategic approach to these upcoming challenges and opportunities, of which the elimination of LCRs were an important part, varied significantly. An overview of the main policy developments – within each country individually as well as common regional developments – is provided in appendix 25, which is based on the following discussion.

Upon joining the WTO in 1995, both countries notified prohibited LCRs as required by the provisions of the TRIMs agreement. As developing countries, both were permitted to make use of the five-year phase out period for existing TRIMs, in which they continued with policies adopted previously.

The Malaysian government had already progressively expanded the MDP's deletion list, and introduced, in 1992, the Local Material Content Policy, which entailed a progressive increase in

local content each year, and was attached to tax incentives (Rosli and Kari, 2008: 106). For small passenger vehicles, the required local content ratio was set to increase annually from 30% in 1992 to 60% in 1996; the rates were slightly lower for larger vehicles.

Thailand's localisation policy required similar ratios, set at 54% for passenger cars and 70% for diesel engines. In 1992, the policy was extended due to requests by producers (Athukorala and Kohpaiboom, 2010: 4). However, the targets were realistic and did not overly constrain vehicle manufacturers, as the "Thai authorities adopted a consensual approach to setting LCR target in consultation with automakers" (ibid.: 12).

At the same time as the multilateral negotiations were taking place, in response to the small scale and fragmented nature of national markets in the ASEAN region, Japanese firms began to press for increased regional cooperation, "seeking to increase their economies of scale through mass production in different ASEAN countries, followed by intra-regional trade" (Farrell and Findlay, 2001: 9-10). Indeed, as Wad (ibid: 185) observes, the ASEAN market "has scale when it is fully integrated into a free trade area… With auto AFTA on the horizon in the early twenty-first century automobile MNCs" 'lined up' to improve their market share.

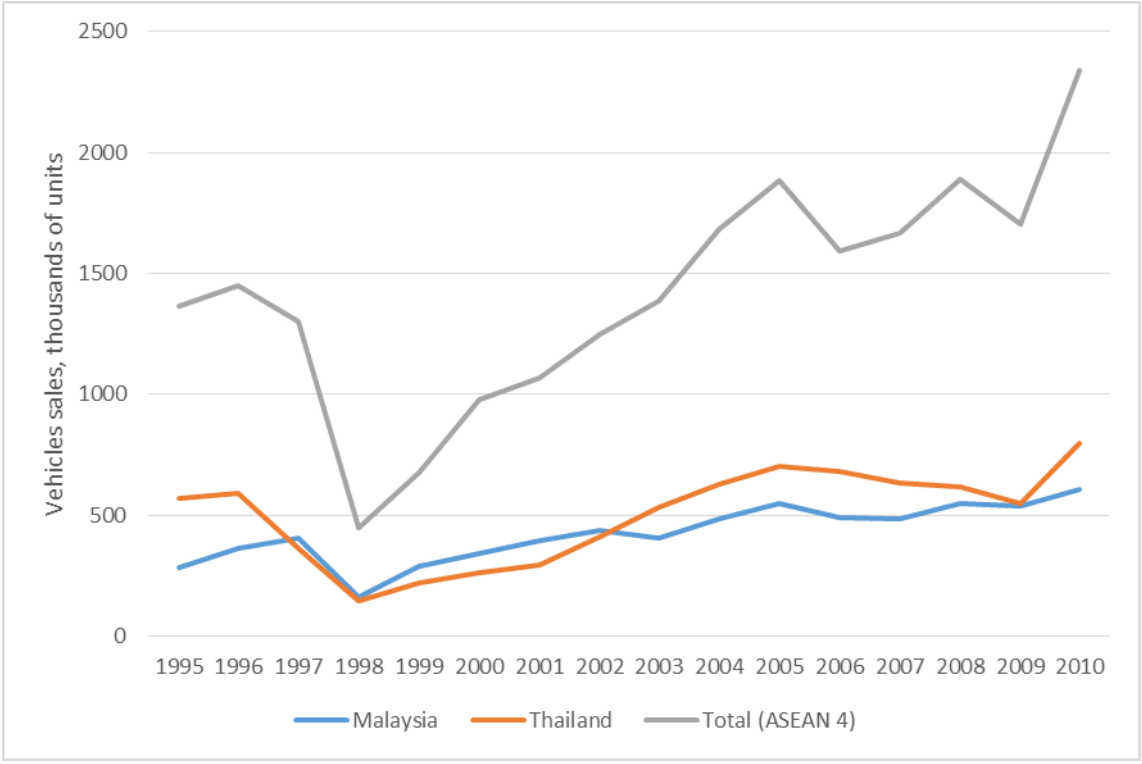
The first attempt at regional integration was the Industrial Complementation Scheme, which mooted the ambitious goal of an 'ASEAN car' but which was not enforced, due to national protectionist pressures (Shimizu 1999). The Brand to Brand Complementation (BBC) scheme of 1987, and its successor, the ASEAN Industrial Cooperation (AICO) scheme of 1996 attempted to establish a regional division of labour but was limited by states' "adherence to maintaining national interests" (Yoshimatsu 1999, Yoshimatsu 2002); Malaysia's continued commitment to automotive nationalism being the most important case in point, as discussed below.

Despite these setbacks, enhanced regional integration – as an alternative to complete liberalisation – had long been a practical inevitability. In 1992, ASEAN members agreed to establish the ASEAN Free Trade Area (AFTA) – adopting a common effective preferential tariff (CEPT) of between 0 and 5% between members but no common external tariff (CET) – with full implementation of zero intra-regional tariffs due by 2010. However, countries were able to detail 'sensitive' items to be temporarily excluded from intra-regional tariff reductions; the deadline for temporary exclusions to be lifted was originally set at 2003.

In the midst of this period, financial crisis shook the region, with profound effects on income, employment, and thus, demand for automotive products. Vehicle sales dropped by approximately two thirds, after continuous growth since the mid-1960s (Table 6-8).

The financial crisis is important for my analysis for two reasons. Firstly, it has obviously had an important knock-on effect in terms of the demand for automotive parts, to the extent that these are a function of domestic demand for and production of finished vehicles. Secondly, it has contributed to the denationalisation of the industry as struggling Thai firms have been bought up or supplanted by foreign – mainly Japanese – competitors. At the same time, both of these phenomena have profound implications for any (comparative) analysis of industrial performance in Malaysia and Thailand because they have occurred simultaneously with the policy change under examination; and have affected each country in different ways. Paradoxically, the crisis appears in some respects to have supported Thailand's efforts to create an efficient supply industry in the context of the inevitable elimination of LCRs.

Table 6-8: Vehicles sales, thousands of units: Malaysia, Thailand and 'ASEAN 4'



Source: 1996-2007: JAMA (2015); 2008-13: OICA (2015). NB. ASEAN 4 comprises Indonesia and the Philippines in addition to Malaysia and Thailand.

As Busser (2008: 33) observes,

> In part the crisis within the automobile industry was solved by exporting more than before. This in itself was only possible because the assembling companies in Thailand were almost all Japanese at the time of the crisis. These companies were willing or forced and at the same time also able to increase exports from their Thai factories and divide the pain over a larger number of their domestic and foreign plants. The same happened with Japanese parts suppliers in Thailand.

According to Wad (2009: 175), 'normalcy' – i.e. growth – only returned to the industry in 2000, but was very uneven: between 2000 and 2007, vehicle production in Thailand quadrupled while Malaysia saw more modest growth of around 40%. The data are considered in the context of wider changes to value chain governance structures, and the role of Japanese FDI, below.

6.3.3.2 The elimination of LCRs

Prior to the crisis, the Thai government had intended to eliminate LCRs earlier than required by the WTO but instead delayed until January 2000 (Natsuda and Thoburn, 2013: 427). Nevertheless, Thailand was the first developing country member to eliminate automotive LCRs (Athukorala and Kohpaiboon, 2010: 4). At roughly the same time, the government removed other restrictions pertaining to equity ownership. As Athukorala and Kohpaiboon (ibid.: 13) note, these aspects of liberalisation

> were instrumental in setting the stage for linking the domestic industry to global production networks. As discussed, abolition of these restrictions prompted and facilitated MNE automakers and part suppliers to set up new affiliates and/or to bring more cutting edge technology to the affiliates in Thailand by consolidating their ownership in these firms.

Malaysia, on the other hand, requested extensions to the standard transition period (WTO documents G/C/W/174 and G/C/W/291) ostensibly in order to mitigate the impacts of the

financial crisis. According to the initial extension request, the crisis "severely impacted the development of the motor vehicle industry in Malaysia. It had set back Malaysia's industrialization programme in the automotive sector, which was on track towards achieving economies of scale and global competitiveness". Furthermore, by the time the Thai automotive sector was well on the way to recovery, as discussed below, Malaysia submitted a second application for an extension, arguing that discontinuation of LCRs would lead to retrenchment of employees and closure of plants.

LCRs were eventually phased out by January 2004, although, as observed by Natsuda et al. (2013: 125), "other policies were introduced so as to maintain *de facto* protection" at this stage. In particular, while formal requirements to incorporate local parts and components were eliminated, the government has continued to provide low interest loans and fiscal advantages (i.e. subsidies) to enable the rationalisation of the supply sector. Such policies benefit the national car producers and reward local value added (ibid.: 126). In addition, the discretionary use of import permits has been maintained.

Perhaps unsurprisingly, Malaysia has also been reluctant to engage fully in regional integration in the automotive sector; as Wad and Govindaraju (2011: 160) note, the Malaysian parts sectors is "unable to compete with its counterpart, Thailand that has well established its parts and component manufacturing clusters". While Thailand (as well as the Philippines and Indonesia) removed automotive products from the AFTA exclusion list in 2000, Malaysia delayed their inclusion until 2005, and even then did not reduce tariffs to the CEPT rate until 2008. Furthermore, the government has responded to its ASEAN commitments by increasing excise duties to compensate for tariff reductions, such that local producers are still protected by the measures (Natsuda et al., 2013: 126). Clearly, Malaysia has struggled to reform the automotive sector, whether as a result of political opposition or difficulty adjusting economically, whereas in Thailand liberalisation coincided with macroeconomic conditions and regional market development to encourage a wave of Japanese investment in Thai assembly operations that was to greatly benefit the supply sector.

6.3.4 FDI and value chain governance structures

In 2008, Thailand had a total of 21 assemblers, 16 of which manufactured cars and 5 motorcycles (Busser, 2008: 35). At this time, there were 15 car-makers operating in Malaysia; however, unlike Thailand, these included the two 'national' brands, Proton and Perodua (Wad and Govindaraju, 2011: 159). Malaysia is the only country in ASEAN in which sales were not dominated by Japanese brands, although the national brands were joint ventures with Japanese firms Mitsubishi, and Daihatsu and Mitsui, respectively (ibid: 158). Table 6-9, below, shows the distribution of market share of the top five firms in 2010.

Table 6-9: Distribution of market share (vehicles), top five firms: Malaysia and Thailand, 2010.

Thailand		**Malaysia**	
Firm	**% market share**	**Firm**	**% market share**
Toyota	40.7	Perodua	31.2
Isuzu	19.1	Proton	26.0
Honda	14.3	Toyota	15.2
Nissan	6.8	Honda	7.4
Mitsubishi	4.9	Nissan	5.5
Others	14.2	Others	14.8

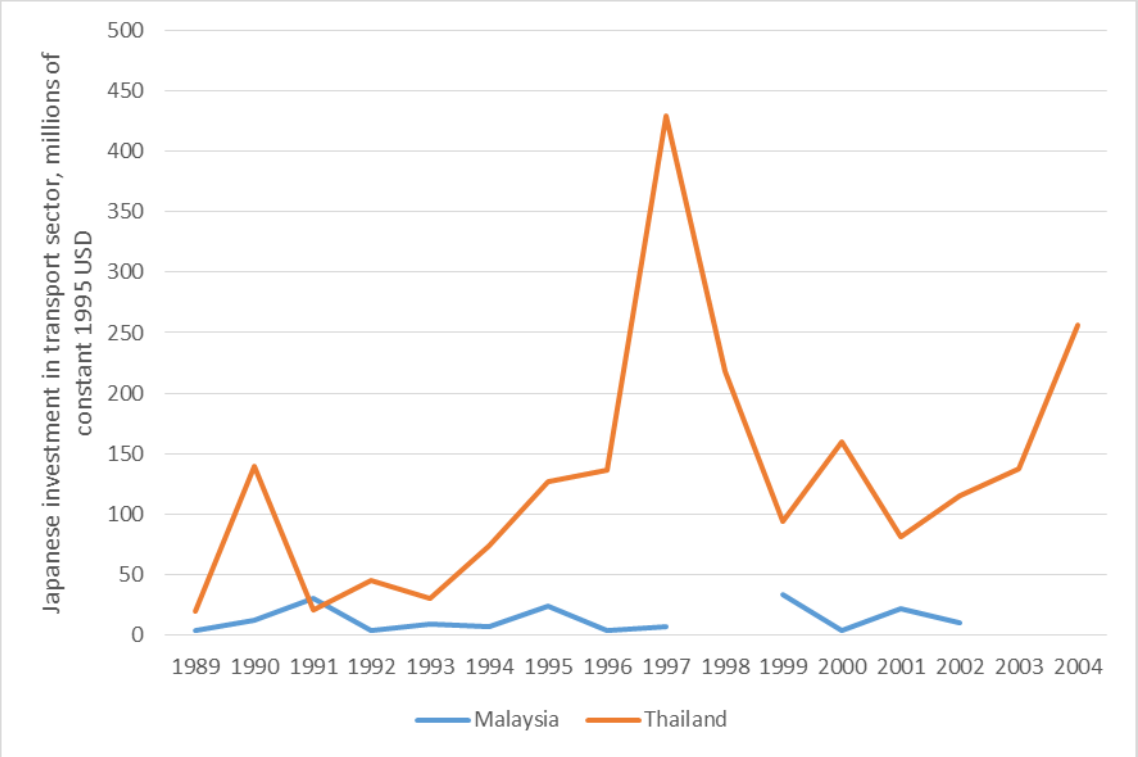
Source: Natsuda and Thoburn, 2014: 1362.

Thailand has been a far more attractive location for automotive FDI than neighbouring Malaysia. The most significant indication of this fact is the divergence in inward investment flows from

Japan. Although data are not available for the automotive or parts sectors specifically, figure 6-12 below shows inflows into the wider transport sector. These data are in absolute terms and so do not take into consideration the size of the economy, but nevertheless the difference is stark. Thailand experienced a large spike in investment between 1996 and 1998, and although some data are not available for Malaysia during this period, was clearly the preferred location for Japanese auto investments. This trend has continued during and post-liberalisation, with Natsuda and Thoburn (2014: 1364) commenting that "Thailand attracted approximately 20 times more Japanese FDI than Malaysia in the period 2005-2010".

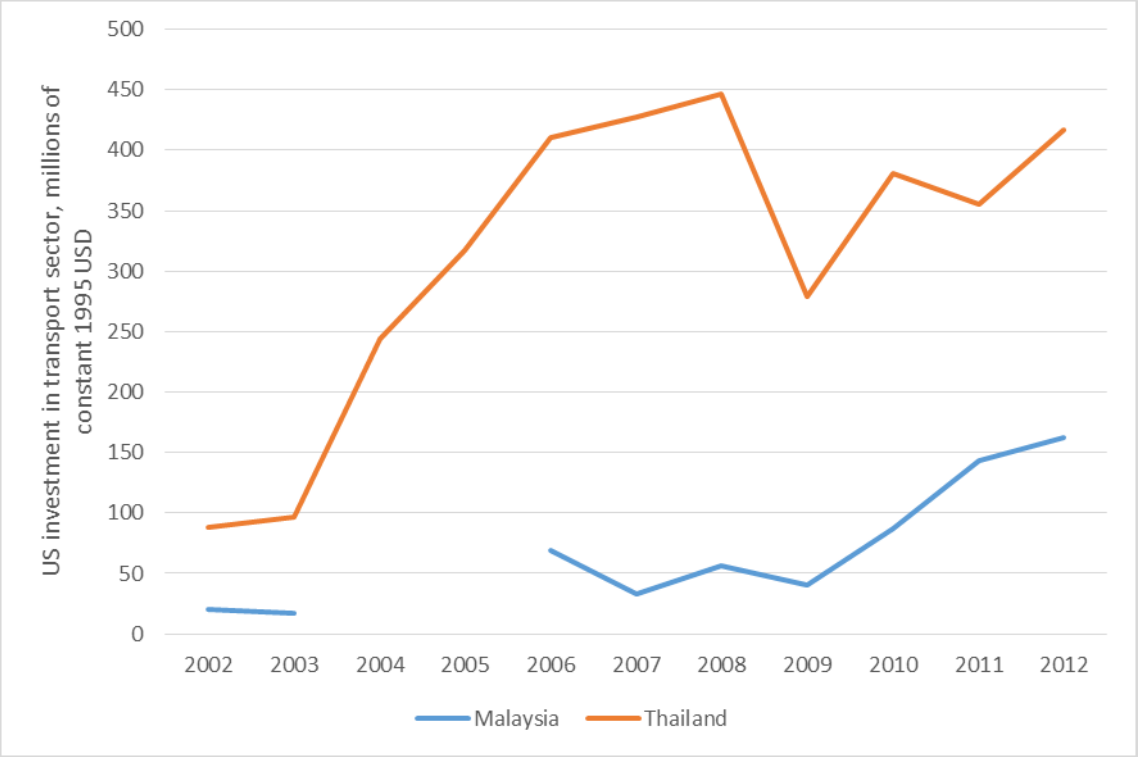
The data on US investment tells a similar story. US automotive investment in the region was negligible prior to the 2000s, when "the American big three assemblers – Ford, Chrysler and GM – decided to establish their own assembly plants in Thailand as regional hubs" followed by investments by the US-based multinational parts suppliers Dana, Visteon and Delphi (Natsuda and Thoburn, 2013: 427). In contrast, Malaysia attracted very little US inward investment either before or after liberalisation, as reflected in the aggregate transport sector data shown in figure 6-13, below.

Figure 6-12: Japanese investment in transport sector, millions of constant 1995 USD: Malaysia and Thailand, 1989-2010.



Source: Japanese Ministry of Finance (2015) data based on international transactions in securities reported by major investors (series discontinued in 2004); 2006-10: ASEAN-Japan Centre (2015) data based on balance of payments reports. NB. Omitted data points indicate non-availability of data rather than zero investment.

Figure 6-13: US investment in transport sector, millions of constant 1995 USD: Malaysia and Thailand, 2002-2012.



Source: US Bureau of Economic Analysis (2015). Note: missing data for Malaysia, 2003-4 may indicate that data are not available or have been suppressed "to avoid disclosure of data of individual companies".

A crucial difference between Malaysia and Thailand, which has had profound impacts on the entire automotive value chain, is that Thailand has become an assembly hub for successful global automakers[70] while the Malaysian national car brands have failed to penetrate international markets (Natsuda et al., 2013; Rosli and Kari, 2008; Wad, 2011). This had led to the increasing ownership and managerial involvement of Japanese MNCs in the management of the Malaysian national producers, including the establishment of a majority equity share by Japanese partners in Perodua in 2001, which has led to the brand being integrated into the global operations of Daihatsu Motors (Natsuda et al., 2013: 128). Proton, meanwhile, continues to struggle to find partners willing to engage in meaningful technological cooperation due to the Malaysian government's refusal to permit majority foreign equity (ibid.). By the mid-2000s, Perodua had overtaken Proton as the largest brand in Malaysia. Furthermore, other Japanese brands manufacturing in Malaysia tend to be geared towards serving domestic demand (Natsuda and Thoburn, 2014: 1366).

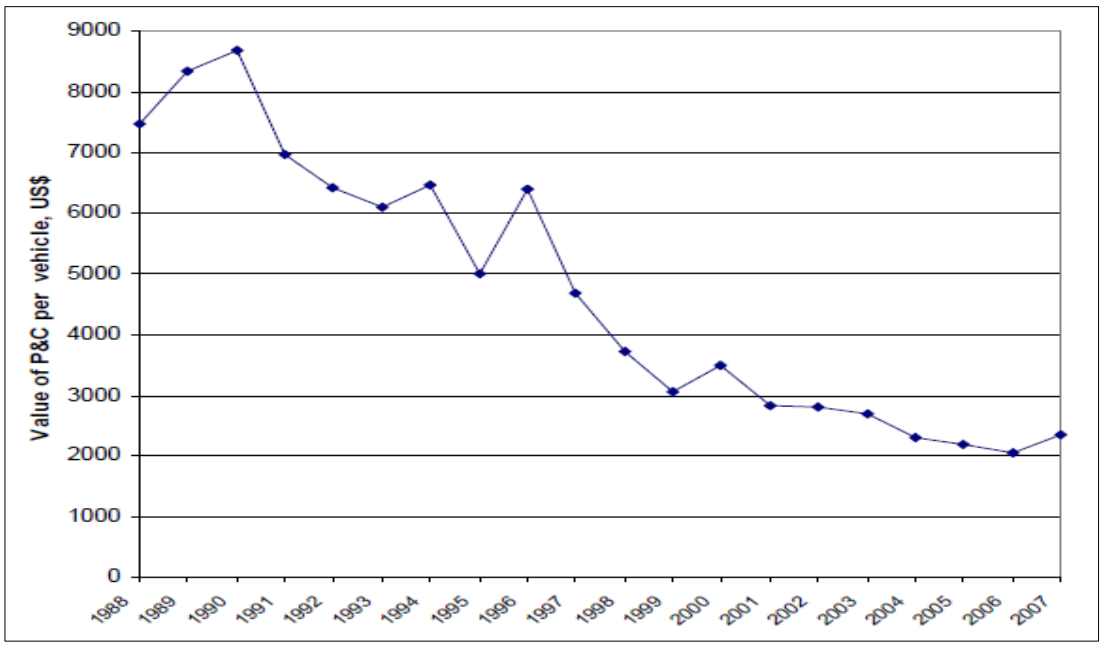
These differences in the orientation of production have had profound implications for the extent to which assemblers are able and willing to invest in relationships with local suppliers, and for the subsequent performance of the latter in terms of local content and trade performance indicators, as discussed below.

For example, Natsuda and Thoburn (2013: 430) report that 95% of Toyota's suppliers are based in Thailand. According to Busser's case study analysis of three pick-up assemblers (2008: 38), 80% of

[70] Interestingly, Wad (2009) observes that it has been the US investments, not Japanese involvement, that have contributed most significantly to Thailand's status as an export hub: as he reports, "Japanese makers controlled 81% of domestic sales and 60% of export in 2001, while American firms had 7% of domestic sales but 60% of export production" (p. 185).

parts and components by value were sourced locally; what is striking is that this proportion has *increased* over the 10 years in which local content regulations were phased out (1995-2005). Making use of the greater availability of trade (compared to production) data, Athukorala and Kohpaiboom (2010) estimate the value of imported components per vehicle assembled in Thailand to have decreased by approximately two thirds, as shown in figure 6-14, below.

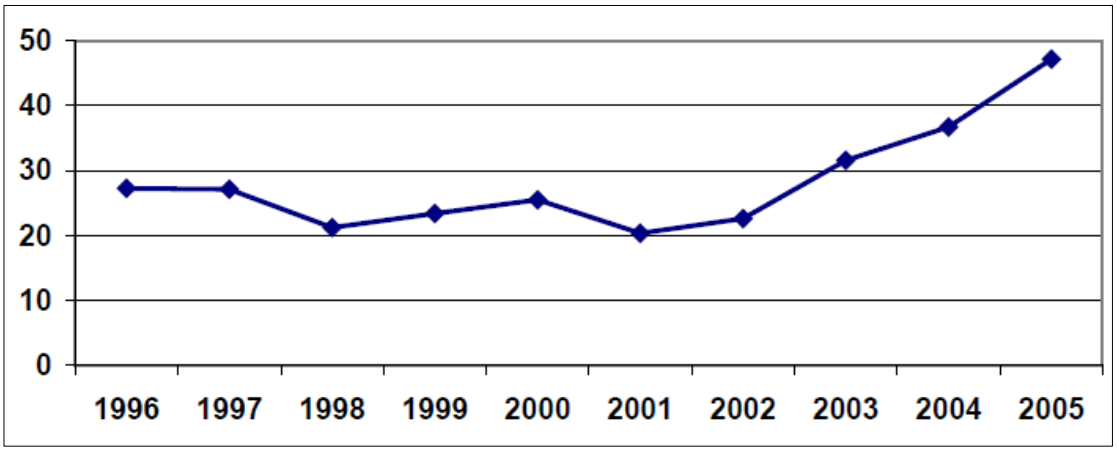
Figure 6-14: Value of imported parts and components per locally assembled vehicle, constant 1988 USD: Thailand, 1988-2007.



Source: Athukorala and Kohpaiboom (2010: Figure 6).

For Malaysia, Ravenhill and Doner (2008: 4-5) analyse data on the locally produced and imported content of the domestic market. They note that while production doubled, imports rose approximately four-fold between 1996 and 2006. Furthermore, the import share of domestic sales has increased sharply in the years following the liberalisation of LCRs, as shown in figure 6-15, below.

Figure 6-15: Import share of automotive components market: Malaysia, 1996-2005.



Source: Ravenhill and Doner, 2008: 6.

In Malaysia, there is a clear distinction between national and global automakers with regards to local content. The local content of Proton and Perodua has been estimated as approximately 90%

and 60-70% respectively, in contrast to 40-50% for Japanese brands (Natsuda and Thoburn, 2014: 1360). The authors also provide data on local content ratios of the same (unnamed) Japanese MNC assembler, reporting that the Thai subsidiary has managed to achieve local content ratios of in excess of 75% while the Malaysian subsidiary reports local content ratios of around 35%, importing most parts and components from Thailand and Japan.

Comprehensive and reliable data on firm concentration levels within the parts and components sector – at the correct level of sectoral disaggregation and permitting inter-temporal comparison pre- and post-elimination of LCRs – are not available. Nevertheless, available secondary data suggests that the consolidation and increased concentration observed globally and discussed in chapter 3 are likely to have affected both the Malaysian and Thai auto components sectors.

Denationalisation appears to be pronounced in both countries. Ownership within the parts and components sector has traditionally been similarly diversified in both countries: local firms comprise the majority in sheer numbers, with Japanese firms dominating the foreign sector. In 1998, the percentage of Japanese owned parts and components suppliers in Malaysia and Thailand stood at approximately 27% in both countries (Farrell and Findlay, 2001: 45). While locally-owned firms are in a numerical majority, foreign firms are over-represented in the category of first-tier suppliers. Contributions to the special edition of the Asia Pacific business review on *Multinationals, Technology and Localization in the Automotive Industry in Asia* have demonstrated that "foreign firms are also technologically superior and more competitive than local firms among suppliers in Thailand and Malaysia" (Rasiah, 2008: 166).

In Malaysia, as of 2004, local firms continued to dominate parts and components supply for Proton, with 79% of firms having majority ownership. However, the findings of Rosli and Kari (2008: 115) confirm "the general belief that local suppliers lack the capabilities to compete effectively with foreign suppliers". Proton, having failed to upgrade its suppliers, "switched partly to global first-tier suppliers in the 2000s" (Wad and Govindaraju, 2011: 167).

In Thailand, although the Japanese automakers have achieved impressively high local content ratios (as discussed above), this has often occurred 'at the expense' of local suppliers. Natsuda and Thoburn (2013: 430) report that 64% of Toyota's suppliers are Japanese firms in Thailand; Busser (2008: 38) adds that over 90% of inputs come from these firms. During the course of the 1990s, local content policies and "the increasing exchange rate cost of imports from Japan, led to a series of investments in the ASEAN region from Japanese parts and components manufacturers who relocated part of their output to the region to assist their OEM partners" (Farrell and Findlay, 2001: 23). According to Busser's qualitative research into the Thai automotive value chain, "this development, together with the financial problems during the Asian crisis, has pushed many Thai suppliers back from first suppliers to second tier suppliers" while "other Thai companies were driven out of the market" (Busser, 2008: 38-9). According to Athukorala and Koipahboon (2010: 6), "many foreign part suppliers, which had been operating through joint ventures with local partners, expanded production capacity following the removal of ownership restriction in 1998, by increasing their equity shares and, in some cases, by acquiring full ownership".

The longer term impacts of processes of denationalisation and consolidation in the parts and components sector have not been analysed in terms of the strategic behaviour of the global suppliers, for example with respect to transfer pricing and the suppression of wage demands, and this represents an important gap in the empirical literature. However, according to Busser (ibid.), technological agreements between Japanese parent firms, their subsidiaries in Thailand, and Thai-owned partners, provide an opportunity for the former to transfer profit back to Japan. Polio (2012) concurs, identifying "two main problems for local auto industry: the first is a substantial

technological dependence from foreign assets and the existence of captive linkages between foreign assemblers or first tier suppliers and Thai suppliers; the second is a partial transfer towards the Triad – mainly Japan – of the value created in the country, which happens through technological dependence and trade deficit mechanisms".

6.3.5 Summary and conclusions

6.3.5.1 The contribution of LCRs to performance outcomes (RQ 2)

Although it is difficult to quantify the precise impact in either case due to the complex interplay of location- and ownership-specific advantages and the strategies of MNC automakers, nevertheless it seems clear that LCRs have had cumulative effects on subsequent sectoral development and that their elimination has given rise to divergent effects. In both LCRs originally established networks of local suppliers as well as drawing in foreign firms seeking to access protectionist rents.

However, the nature of cumulative effects has differed hugely, giving rise to increasing divergence. In summary, "Thailand's use of local content requirements, later abolished under WTO rules, helped promote local suppliers and did not deter foreign investors" (Natsuda and Thoburn, 2013: 413), while in Malaysia, the policies did not have the same substantive effects because TRIMs were implemented alongside a package of measures that were unfavourable to foreign investment.

Thailand appears to have set LCRs that were challenging but realistic, and were successfully attained by a number of Japanese vehicle manufacturers prior to the fiscal crisis and the elimination of LCRs towards the end of the 1990s. In light of such established supply networks, which were already characterised by the presence of Japanese suppliers, the effect of liberalisation has been to strengthen the position of Thailand as a regional and global export hub and has also contributed to the deepening of the supply base and rising levels of local content.

6.3.5.2 The contribution of the elimination of LCRs to performance outcomes (RQ 3)

The elimination of LCRs has contributed to an ongoing process of denationalisation, as the advantages of multinational firms become ever more apparent in a more open trading environment. In Thailand, this had helped to reorient the originally tariff- and LCR-jumping investments towards the establishment of a globally competitive industry: "abolition of these restrictions prompted and facilitated MNE automakers and part suppliers to set up new affiliates and/or to bring more cutting edge technology to the affiliates in Thailand by consolidating their ownership in these firms" (Athukorala and Kohpaiboon, 2010: 13).

In contrast, the Malaysian parts and components sector is "unable to compete with the counterpart, Thailand that has well established its parts and component manufacturing clusters" (Wad and Govindaraju, 2011: 160). In Malaysia, the success of local suppliers post-liberalisation has been curtailed by their partnership with failed national car brands and exacerbated by the lack of capabilities required for adaptation and reorientation towards global markets. Thus, in the case of Malaysia,

> the very policies that seek to promote the local automotive parts industry have proved to be its nemesis. By limiting the access of foreign assemblers to the domestic market and by imposing restrictions on foreign investment, the government largely ruled out the possibility of Malaysia becoming a regional hub for foreign auto assemblers and for foreign first-tier components suppliers, who largely turned to Thailand (Yusuf and Nabeshima, 2009: 112).

As a result, Malaysia has continued to practice protective and discriminatory automotive policies in an attempt to maintain the position of its national champion in the face of overwhelming difficulties. Unfortunately, "while the Malaysian government insists on retaining majority Malaysian local ownership and control, it seems that foreign companies are unwilling to treat Proton as one of their own, fully upgrading its (and its vendors') technology and feeding it into their global networks" (Natsuda et al., 2013: 128).

6.4 ARGENTINA AND BRAZIL

6.4.1 Overview

The comparison between Argentina and Brazil permits exploration of several important phenomena in the context of the impact of the elimination of LCRs. In the early 1990s, both countries operated mainly autarkic automotive regimes, in which LCRs had led to high levels of local content, but very little integration of local firms into global production networks. Consequently, LCRs were becoming a burdensome policy instrument at odds with the trajectory towards liberalisation and increased competition that characterised the sector during this period.

Nevertheless, LCRs were reformed as part of a package of efforts to rejuvenate the sector without jeopardising the linkages that had emerged during the import substitution era. LCRs mandating lower levels of local content were applied in conjunction with trade balancing and export incentives that were applied to the assembly sector as a whole, and gave rise to a large increase in foreign investment, including in the parts and components sector, especially in Brazil. In Argentina, the policies were continued throughout the early 2000s in a more defensive manner, serving to "cushion the impact of the 1998–2002 crisis on the auto parts industry" (UNCTAD, 2007: 36). Thus, it appears that LCRs were not, in the context of their implementation between 1995 and the early 2000s, overly burdensome and on the contrary, worked alongside complementary policies to protect and promote parts and components production in the region.

The manner in which the elimination of LCRs has occurred in the Mercosur region also raises interesting points in the context of this thesis. Performance outcomes, in terms of local content and trade performance indicators, are difficult to separate from wider factors. One of the key concerns is the extent to which multilateral rules effectively proscribe the use of trade policy to shape industrial development. In the case of Argentina and Brazil, this appears not to have been the case. Regional integration through Mercosur has substituted national with regional protective policies, obscuring the impact of the elimination of LCRs. In the past 20 years, the region has seen devastating macroeconomic crisis as well as profound structural change and competitive pressure in the automotive sector.

Notwithstanding this obscuration, the removal of LCRs, and their replacement with regional instruments, has certainly contributed to wider processes of denationalisation and regionalisation of value chain structures, including technological upgrading but also greater import propensity. Nevertheless, local content ratios would arguably have fallen more rapidly in the absence of the influx of investment that was stimulated by the use of LCRs in conjunction with investment incentives, and both countries have managed to maintain strong export performance. Moving beyond similarities, Brazil has clearly been the more attractive location for automotive investment in recent years, especially in the parts and components sector, and liberalisation has contributed to the diversion of investment from Argentina, notwithstanding the reinstatement of national protective (regional trade balancing) policies by Argentina in the context of Mercosur. Thus the comparison serves to reinforce the theory that the impacts of LCRs and their elimination lead to

divergent outcomes between close competitors operating within regional automotive spaces, depending upon the contexts in which reforms have taken place.

6.4.2 Localisation policies in the historical context of automotive sector development

6.4.2.1 From import substitution to export promotion: 1950s – 1980s

In the 1950s, foreign carmakers, originally predominantly US firms, set up 'stand-alone' subsidiaries to assembly 'knocked down' units in order to avoid the prohibitively high tariffs on finished vehicles; these were followed by European firms in the 1960s and 1970s as international capital competed for control over new markets in a process of 'multi-domestic internationalization' (Jenkins, 1987: 40-45; Laplane and Sarti, 2004: 121).

Initially vehicle production was approximately equal in both countries, but the Brazilian market soon began to grow at a faster rate until by the mid-1970s the number of vehicles manufactured in Brazil was approximately three times that of Argentina (Arza and López, 2008: 14) and over six times by 1982 (Jenkins, 1987: 209). This divergence has continued to date as shown in figure 6-19, below.

In the initial stages of development, the sector was highly import intensive in both countries, and there were few linkages between the assembly sector and the local economy. In order to remedy this, both countries implemented ambitious automotive policies aimed at promoting domestic production across the assembly and supply sectors – including local content policies, prohibition of the importation of key components, and restrictions on 'in-house' components production by assemblers (Jenkins, 1987: 63) – throughout the 1960s and '70s. As a result, local production of vehicles grew steadily while the number of imported vehicles fell to extremely low levels – in Argentina, from over 100,000 in 1959 to fewer than 2,000 in the 1970s (Arza and López, 2008: 60); in Brazil, imports were practically eliminated (ECLAC, 1998: 242). According to ECLAC (1998: 242), this period was "characterized by a qualitative change in automotive activity, which ceased to be an assembly function and became one of true transformation" which succeeded in accomplishing levels of national content of around 90% of parts (ibid.), over 50% of total value-added of finished vehicles (Jenkins, 1987: 72), and "a relatively complete range of suppliers" (ibid.: 127) in terms of product coverage by 1970.

However, despite growth in output and employment and the presence of highly protective trade policies, by the early-1970s, both Argentina and Brazil had sizeable trade deficits in the automotive sector (Jenkins, 1987).

I response, the governments of both countries implemented reforms to the automotive industry. These reforms took the form of partial liberalisation, promotion of exports, and later, tentative moves towards regional integration. In Brazil, the government began to reduce local content requirements in the mid-1970s; reforms followed in Argentina, between 1979 and 1982, with the government dropping the ban on imported vehicles (Jenkins, 1987: 207; Arza and López, 2008: 60). Nevertheless, import tariffs on finished vehicles and stipulated local content levels remained high. In Argentina, tariffs on vehicles were reduced from 95 to 55% for cars and 65 to 45% for commercial vehicles, while local content requirements were reduced to 88 and 75% for cars and commercial vehicles respectively (Jenkins, 1987: 197). Local content requirements of between 78 and 85% were maintained in Brazil, and basic tariff rates were not significantly reduced.

However, at this stage preferential fiscal treatment was linked to the attainment of automotive exports in both countries; "the main thrust of policy was to renegotiate the form of insertion of the local into the global motor industry" (ibid.: 194). These policies were especially prevalent in

Brazil, where the government engaged in a sustained process of bargaining with multinational assemblers throughout the 1970s and '80s (Shapiro, 1994). Trade liberalisation continued to proceed throughout the 1980s; by the early-1990s, both countries had reduced applied tariffs on transport equipment by approximately 60% of their average value in the mid-1980s.

During this period, the region was also characterised by political instability and the onset of the debt crisis, the impacts of which are difficult to separate from policy and institutional developments that occurred simultaneously. In any case, vehicles sales dropped sharply; between 1981 and 1990, the number of parts suppliers fell from 856 to 580 establishments in Argentina (Arza and López, 2008: 61). According to Jenkins (1987: 213), productivity levels remained fairly stagnant over the same period. The situation was slightly more positive in Brazil, which exhibited some success in exports, partly in response to stagnation in domestic demand; at this stage, the two countries diverged in relation to trade performance. Brazil had established a substantial trade surplus in the automotive sector as a whole by the early 1980s, whereas Argentina established a deficit.

6.4.2.2 Liberalisation and modernisation, early- to mid-1990s

Despite more outward-oriented strategies adopted in the 1970s and 1980s, including some tariff liberalisation, other trade barriers remained high – especially in Brazil – and moves towards trade liberalisation really began in earnest at the start of the 1990s, and comprised unilateral (national), regional and multilateral elements. The Uruguay Round of trade negotiations were well underway, and looked set to introduce binding restrictions on trade policy, including action on TRIMs. Negotiations towards the establishment of Mercosur also began in the early 1990s[71]. In 1994, the *Oura Preto Protocol* detailed the principles of a customs union to be established between Argentina, Brazil, Paraguay and Uruguay – formally taking effect in January 1995, and thus coinciding with the establishment of the WTO. The aims of Mercosur automotive policy were to establish complete intra-regional free trade and establish a common external tariff by 2000. As it turned out, there were significant differences between national governments with respect to the nature of integration and the establishment of full intra-regional free trade, the implications of which are discussed further below.

Nevertheless, in both countries, the impending implementation of regional and multilateral integration combined with changes in the political climate and rising consumer demand for vehicles, gave rise to a raft of policies aimed at modernising Argentina and Brazil's respective automotive industries. In Brazil, the government committed to reduce tariffs on vehicles from 80 to 35% between 1990 and 1994. Subsidy programs relating to exports were suspended, while the government provided tax incentives for sales of 1000cc 'popular cars', in which the region began to specialise (Laplane and Sarti, 1996[72]). Argentina implemented similar policies in the early 1990s in the midst of the fallout from recession, hyperinflation and rapid trade liberalisation in the preceding years. Mirroring developments in Brazil, producers, suppliers, unions and the state agreed to measures aimed at reducing the price of cars to consumers by 33%. In both countries, local content requirements continued to feature, set at around 60% of parts by value in both

[71] Regional integration of automotive production systems actually preceded the establishment of regional institutions in South America. In response to the threat of Japanese competition, integration of Argentinian and Brazilian subsidiaries offered opportunities for Western automakers to reduce investment and production costs (Laplane and Sarti, 2004: 122). Early examples of integration include cooperation between VW and Ford to create *Autolatina* in the late 1980s (ibid.).

[72] Laplane and Sarti, 1996: http://gerpisa.org/ancien-gerpisa/actes/20/article3.html.

countries; their anti-export bias was mitigated by trade balancing requirements and fiscal incentives for assemblers holding trade surpluses (Laplane and Sarti, 1996; UNCTAD, 2007: 18-19).

As a result of these factors, productivity in both the assembly and parts sectors grew rapidly from the early 1990s, as Laplane and Sarti (1996) show for Brazil, and data presented in TRIMs extension request (WTO document G/C/W/295) show for Argentina. At the same time, vehicle production more than doubled in both countries.

However, although production increased rapidly, a disproportionate amount of the increased demand for vehicles was met by a surge in imports, as shown in tables 6-10 and 6-11, below. Imports of vehicles in both countries remained low or non-existent throughout the 1980s but rose rapidly in the early 1990s.

Table 6-10: Imports of transport equipment, million USD: Argentina and Brazil, selected years

Year	1982	1985	1988	1992
Argentina	328.9	282.6	237.9	2251
Brazil	903.6	528.7	541.8	1327.4

Source: UNCTAD, 1994.

Table 6-11: Imports of motor vehicles, thousands of units: Argentina and Brazil, selected years

	1990	1991	1992	1993	1994	1995
Argentina	0.4	0.8	22.6	88.5	86.9	135.3
Brazil	-	0.1	11.1	19.8	52.9	155.1

Source: ECLAC, 1998: Table IV.6.

In 1993, both countries still maintained high ratios of local content – 73% in Argentina and 87% in Brazil, according to calculations based on CEP (2015) and Sindipeças / Abipeças (2011). However, these figures had fallen steadily from their previous levels and exports of parts and components were not keeping pace with imports. Suppliers were particularly vulnerable to liberalisation, since the more visible assembly sector was able to exercise considerable pressure on the government to raise protection on vehicles while enabling them to import components in order to make domestic production more feasible; as Laplane and Sarti (2008: 158) note, this allowed assemblers to squeeze their suppliers profit margins, and made their survival extremely difficult. The need to reverse this competitive threat and support local parts production while promoting modernisation within the assembly sector, forms the context for the implementation and elimination of LCRs in the post-WTO period.

6.4.3 The elimination of LCRs and other drivers of parts and components sector performance in the post-WTO era

6.4.3.1 LCRs in the context of unilateral automotive policies, regionalisation and economic crisis

The impacts of the subsequent policy and institutional developments on performance outcomes are complex and difficult to untangle. In short, Argentina and Brazil have implemented unilateral and regional measures aimed at maintaining their respective positions as viable automotive spaces in the face of processes of liberalisation and regionalisation that were well underway by the mid-1990s. At the turn of the century, the region was hit by a series of economic crises with had severe consequences for automotive sector development. It is in this context that the analysis of the effects of LCRs through the 1990s must be situated. Key policy developments are summarised in appendix 26, below.

There are two main conjunctive factors to discuss in the context of industrial performance and the impact of the elimination of LCRs: moves towards an expanded regional market in Mercosur, and the occurrence of regional economic crisis between 1997 and 2002.

A key factor influencing potential market demand is the establishment of an integrated regional market. According to Arza (2011: 134), integration within Mercosur has gone through four stages: 'no integration', 'towards integration', 'deepening integration', and 'reversing integration'. Prior to 1995, each country pursued their own unilateral policies, as described above. Between 1995 and 2000, Argentina and Brazil moved towards integration with free trade in automotive products attenuated by trade balancing clauses; regional content was permitted for the purpose of local content requirements. These moves towards regional integration prompted a "sharp change in automotive firms' behaviour regarding Mercosur" and a rapid increase in investment in the second half of the 1990s, prior to the economic crisis (Laplane and Sarti, 2004: 125). The key feature of the mid-1990s was thus "the consolidation of a regional production platform in line with the investment plans of TNCs" (UNCTAD, 2007: 28). Integration has arguably reinvigorated production in both countries as national policies have been replaced by regional protection and the production systems have been recast on regional lines. This has led to a coherent regional market in which there is a strong link between supply and demand and trade is predominantly intra-regional: "given the predominantly inward orientation of supply, Mercosur's relative importance within the global motor industry relies mostly on the size and potential of the regional market" rather than upon exports (Laplane and Sarti, 2004: 124).

However, at this stage, unilateral policies were pursued with renewed vigour. In the aftermath of the entry into force of the WTO Agreement, both Argentina and Brazil scaled up the incentives attached to LCRs and other TRIMs. Argentina had already increased tariffs in the early 1990s, and Brazil did the same in 1995 and 1996. Each country's strategies throughout the 1990s represented attempts to establish the Mercosur region as a viable automotive space and reverse the huge inflows of imports into the region, while preparing for the onset of prospective intra-regional competition. Thus, "both unilateral initiatives, the Brazilian regime and the amendment of the Argentinean Automotive Regime, took place as pre-emptive measures amidst efforts to put together the MERCOSUR Common Automotive Policy" (UNCTAD, 2007: 20).

In Brazil, LCRs were implemented as part of a package of measures designed primarily to bolster the assembly sector. Unilateral liberalisation was already underway when the WTO agreements entered into force in 1995, and there were concerns that continued trade liberalisation would destroy domestic industry by flooding the country with imported vehicles. Indeed, in response to a rapid reduction in tariffs, Brazil experienced a surge in imports and a sharply deteriorating trade balance, between 1995 and 1996. In response, tariffs on vehicles were quickly raised from approximately 17 to 45%, and tariff quotas were established, with 70% tariffs applied after the importation of 47,500 vehicles. At the same time, tariffs on parts and components increased only marginally, meaning that the sector was actually subject to negative rates of effective protection. Thus, according to Laplane and Sarti (2008: 158), Brazilian policies had favoured the assembly sector over parts and components suppliers: "In 1995, after which the new policy has been established, not only did protection for cars rose significantly, but protection for components became negative... Unequal protection weakened the position of local suppliers more than elsewhere". To counteract this tendency and support domestic parts and components suppliers, a raft of fiscal incentives related to local content and export requirements were introduced between 1995 and 1997. These policies were designed to promote local production without

penalising assemblers and without introducing an anti-export bias in the assembly or parts sectors.

In Argentina, LCRs were continued post-1995 as part of a broader set of policy measures initiated in 1991. The aims were similar, although for a number of reasons, discussed shortly, LCRs were phased out in different circumstances. Again responding to a bias in favour of assemblers[73], in 1996 Argentina modified its strategy to establish the "so-called automotive parts producer regime" with Decree 33/96 (UNCTAD, 2007: 20). The policy[74] deliberately sought to tackle a trade deficit in automotive parts, counter Brazil's 'aggressive' incentive regime and also to prepare for the full entry into force of the Mercosur customs union (ibid.).

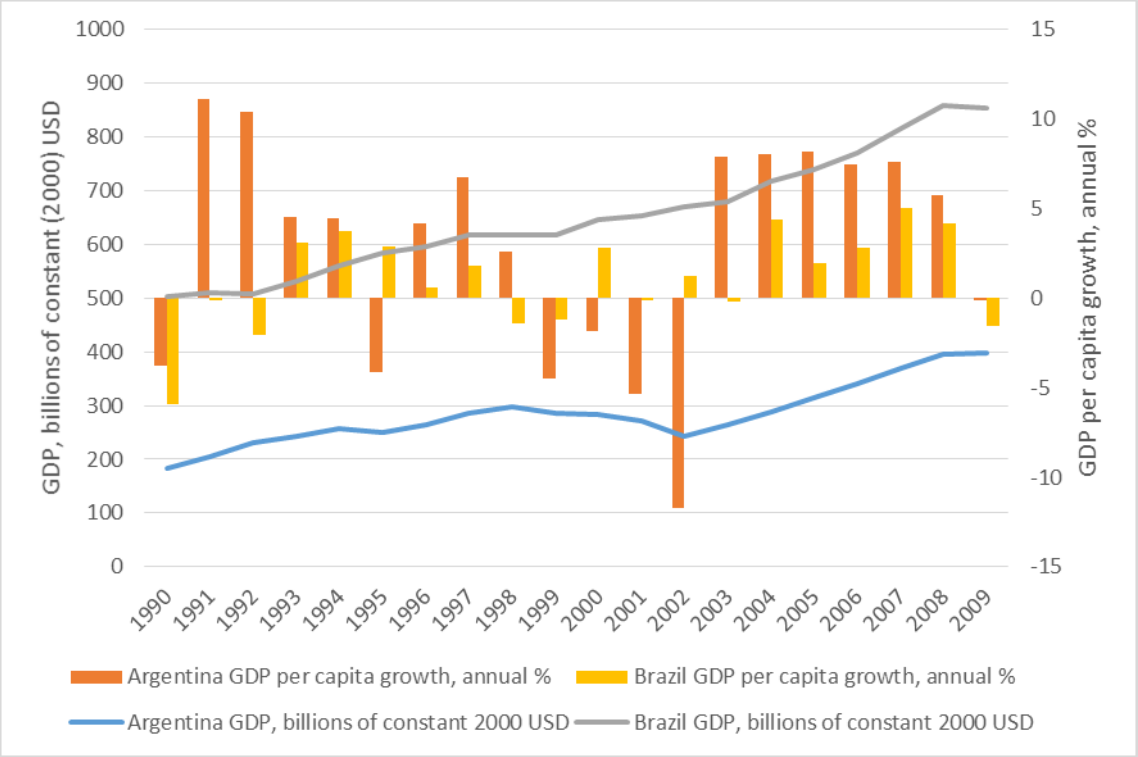
In the end, between 1997 and 2002 – the period in which Argentina and Brazil were scheduled to phase out LCRs and move towards closer regional integration – was characterised by a series of crises in Argentina and Brazil, with profound implications for sectoral performance outcomes. In Brazil, the fall-out from the Asian financial crisis exposed and exacerbated existing structural weaknesses and gave rise to large current account and fiscal deficits. As shown in figure 6-16, the impacts of the crisis on GDP growth are apparent, with GDP remaining flat in constant dollars and falling in per capita terms between 1997 and 1999.

The situation in Argentina was even more pronounced. The country was hit by a loss of competitiveness caused by Brazil's devaluation in 1999, and an accumulation of internal problems which led to a default on public debt. The crisis was caused, as in the Brazilian case, by a combination of two factors: an insufficiently tight fiscal policy and an overvalued exchange rate. The economy underwent a considerable contraction in absolute and per capita terms (figure 6-16).

[73] According to Argentina's 2001 TRIMs extension request (WTO document G/C/W/295), the automotive sector "posted a cumulative deficit of US$20,500 million, chiefly due to the autoparts trade. This occurred during the period when the automotive regime granted high effective protection for the assembly sector, contrasting with the relatively low protection granted to autoparts manufactures" (p. 6).

[74] The details of the Decree were to establish trade-balancing requirements alongside LCRs to encourage sectoral restructuring.

Figure 6-16: GDP per capita growth and GDP in billion constant 2000 USD: Argentina and Brazil, 1990-2009

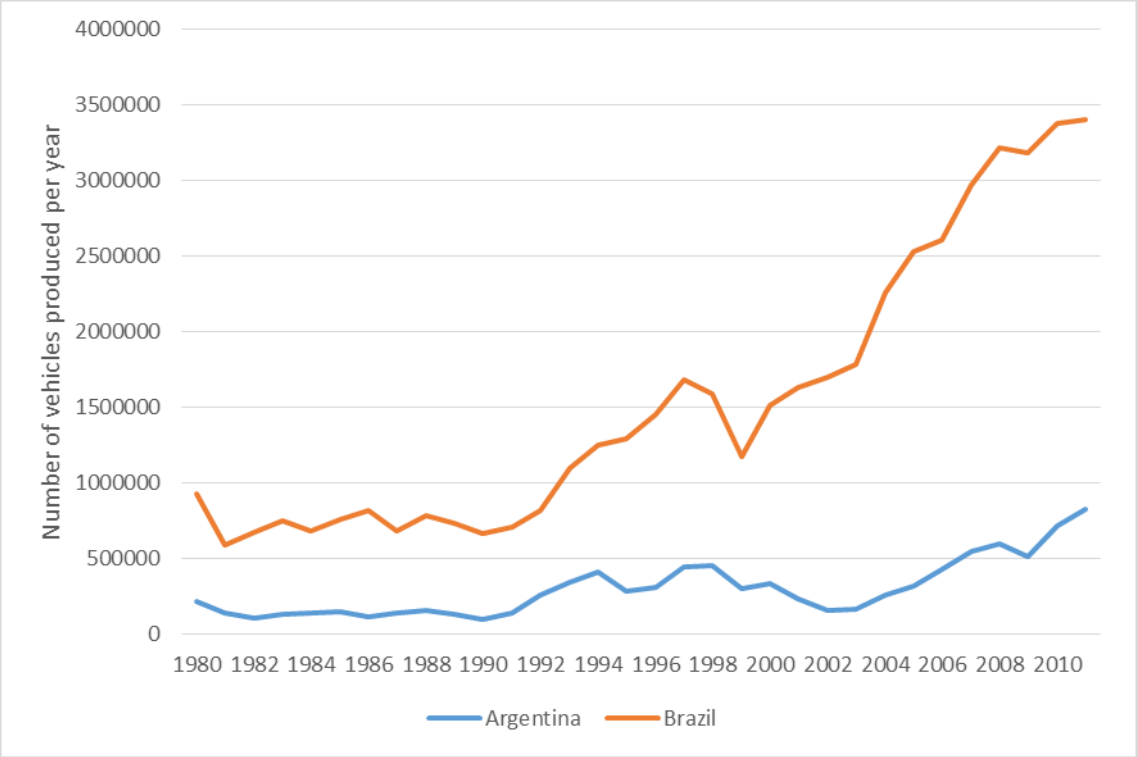


Source: World Bank (2011).

The years following this period of crisis have seen sustained growth in both countries up until the onset of the global financial crisis in 2008/9. Macroeconomic factors have also given rise to dramatic exchange rate shifts which profoundly affect the causal mechanisms through which industrial performance occurs. In 1999, the Brazilian devaluation "represented an immediate competitiveness gain for the Brazilian economy. The new exchange rate translated into lower labour costs in Brazil, which became more attractive for FDI" (UNCTAD, 2007: 29). In this period, numerous firms shifted relocated from Argentina to Brazil, as discussed below. The devaluation has also driven strong export performance in Brazil throughout the 2000s (Arza, 2011).

The effects of crisis and recovery can be clearly seen in the vehicles production statistics, illustrated in figure 6-17, below. It is very difficult to separate the impacts of these fundamental 'drivers' of parts and components production from wider policy and institutional factors.

Figure 6-17: Vehicle production: Argentina and Brazil: 1980-2010



Source: 1980-1998: ECLAC (1998); Argentina, 1999-2006: Arza and López (2008); Argentina, 2007-2011, OICA (2015); Brazil, 1999-2004: Laplane and Sarti (2008); Brazil, 2005-11: OICA (2015).

6.4.3.2 The elimination of LCRs

The TRIMs implemented by Brazil, as described above, were introduced post-WTO membership, despite the fact that signatories are prohibited from introducing new non-compliant measures; Brazil did not notify them according to the usual procedure. As such, the policies were challenged in dispute cases: consultations were requested by Japan, the US and EU respectively (dispute settlement documents DS51, DS52, DS64 and DS81). Although "no dispute panel established and no withdrawal or mutually agreed solution"[75] was notified, Brazil signed a memorandum of understanding and agreed to withdraw the disputed measures by 2000 – consistent with the standard five year elimination period. In the meantime, automakers continued to receive substantial subsidies, leading to significant levels of investment in the assembly and supply subsectors in the years prior to economic crisis, as discussed below.

In 1999, Argentina requested a six-year extension to the standard five-year elimination period mandated by the TRIMs Agreement (WTO document G/C/W/176). The reasons given were that the anticipated restructuring of the automotive sector – including parts and components – had been disrupted by the impacts of successive economic crises emanating from Mexico (in 1995) and Brazil (in 1998). As a result of these factors, it was argued that premature liberalisation of LCRs and other prohibited TRIMs would lead to further deterioration of the automotive trade balance and would jeopardise regional integration through Mercosur in the context of the devaluation of the Brazilian *Real.* As the direct result of these upheavals, the sector had not sufficiently adjusted to the new competitive environment and was "not yet set in its regional specialization mode" (ibid. 3). Argentina was granted a two-year extension to eliminate LCRs by January 2002, with the possibility of a further two years upon request. In the meantime,

[75] http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds52_e.htm.

numerous assemblers and suppliers had relocated to Brazil (Argentinian Trade Policy Review, 2007: 113) and Argentina was hit by its own economic crisis in 2001. The Argentinian government requested another extension which was accepted under the condition that LCRs were finally withdrawn by the end of 2003.

In practice, however, local content requirements were effectively maintained for both countries in the context of the Mercosur agreement until the end of 2005 (UNCTAD, 2007; Argentinian TPR, 2007). In line with the third phase of regionalisation – 'deepening integration' – in December 2000, a common external tariff (CET) was imposed, where previously protection had been dictated by each separate state. Finished vehicles were subject to a CET of 35% while parts and components tariff were approximately half that rate. Tariffs on parts and components not available locally were reduced to just 2%. Tariff-free intra-regional trade continued to be subject to trade balancing provisions. These arose from Argentinian concerns that without safeguards, investment and production would be diverted to Brazil, and indeed, it is likely that such provisions have mitigated against the further divergence of industrial performance that would likely have occurred between the two locations.

Most importantly, while *local* content rules were eliminated during this period, in order to benefit from regional free trade, automakers had to satisfy a *regional* content requirement of 60% by the third year of production. This regional content was split by Argentina and Brazil on a fixed basis[76]; as a result, as UNCTAD (2007: 30-31) observe:

> the fact that a good deal of the basic elements contained in the Argentinean automotive regime were regionalized through the MERCOSUR Common Automotive Policy offset the impact of the phase-out. As a result, there was an extension of the life of the TRIMs under regional rules of origin and regional trade balance requirements. Such substitution did not eliminate the measures but naturally led to a new scenario more active on a regional than a multilateral level

It is therefore crucial to consider that the elimination of LCRs has been mitigated by regional policies which exhibit similar effects but with greater prospects for specialisation and scale in parts production than afforded by local content requirements. However, the regional nature of content requirements does open the possibility of divergence in performance between the more- and less-advantageous locations within the region. As Arza and López observe, "regionalized local content agreements for intra-regional exports favoured a shift in demand towards auto parts produced in Brazil" (2008: 100). For this reason, Argentina pressed to maintain trade balancing and local content provisions within Mercosur, rather than establishing complete intra-regional free trade.

Reflecting Argentinean concerns, the fourth phase of integration, according to Arza (2011), is the reversing of moves towards free trade from around 2005. National policies pursues since the elimination of LCRs are also important to consider. In 2005, the Argentine government enacted legislation designed to assist the struggling parts sector by offering fiscal incentives for the purchase of some locally produced parts and components[77]. Thus, the 'full' impacts of regional integration have been mitigated by exemptions to and reversals of regional free trade, just as the

[76] According to UNCTAD (2007: 34), "the [Argentinian] government's decision to carve out a national allocation on the regional content requirement is best explained as an acknowledgment of the need to reverse the bias against car parts and its potential industrial linkages".

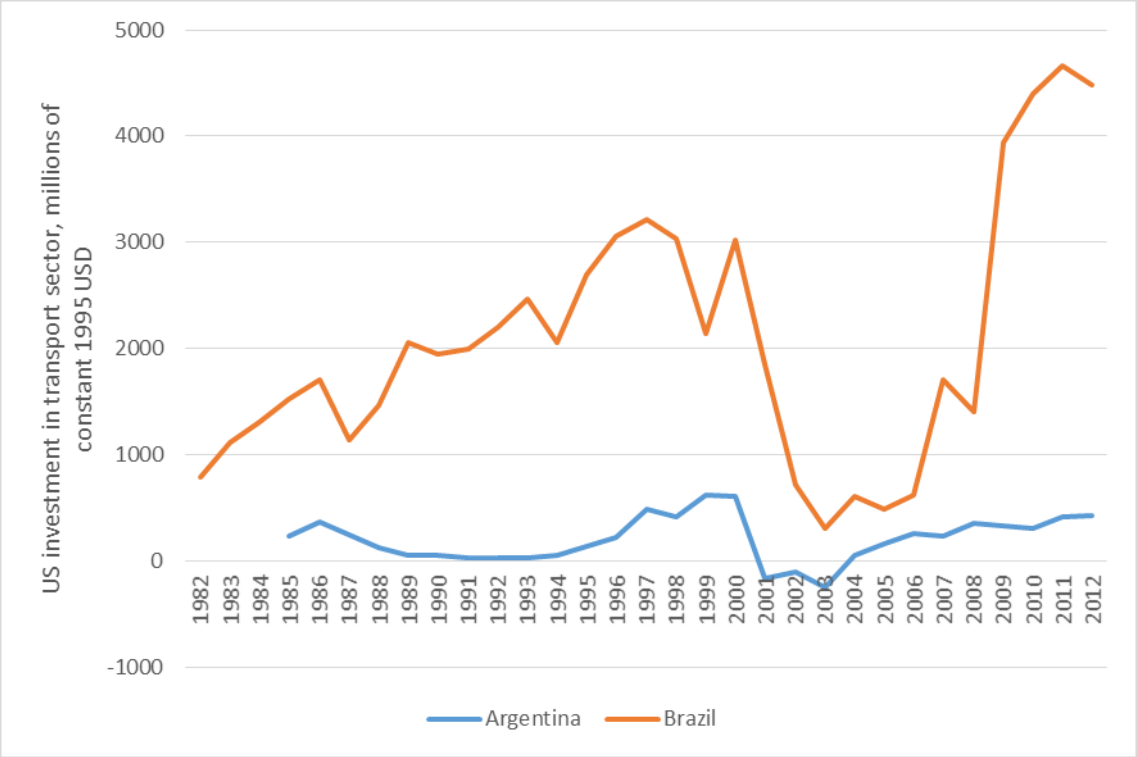
[77] These incentives appear to contravene the TRIMs Agreement, but no action has been taken and the measures were withdrawn in 2008 (UNCTAD, 2007; Argentina TPR, 2007)

full impacts of multilateral liberalisation such as the elimination of LCRs have been mitigated by regional protective policies.

6.4.4 FDI and value chain governance structures

Both Argentina and Brazil saw a spike in US investment in the broader transport and automotive sectors in the years following their respective automotive incentive programmes (figure 6-18, below). Investment declined rapidly in the years directly prior to and following the elimination of LCRs, although this is difficult to separate from the impacts of the economic crisis that hit the region in 1998 and again in 2001. Throughout the entire period, but especially from the mid-2000s, Brazil has attracted the lion's share of US investment, suggesting that it has emerged as the dominant force in the region, even given the size of each country's respective automotive markets. Another important point to note is the substantial disinvestment reported between 2001 and 2003 for Argentina.

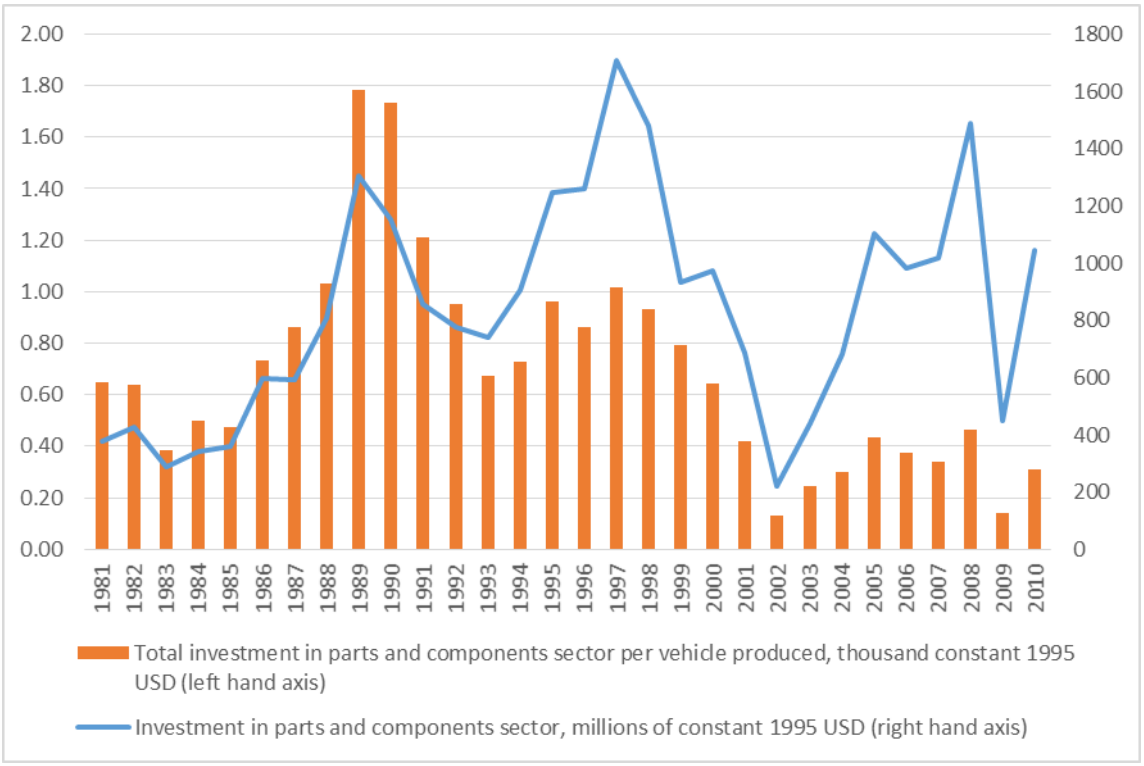
Figure 6-18: US investment in transport sector, millions of constant 1995 USD: Argentina and Brazil, 1982-2012.



Source: US Bureau of Economic Analysis (2015).

Data from the Brazilian automotive parts and components sector industrial association show a large increase in investment over the period that LCRs were in force; this period has seen the largest ratio of parts and components sector investment to vehicle production since the early 1990s (figure 6-19).

Figure 6-19: Investment in parts and component sector, millions of constant 1995 USD: Brazil, 1981-2010.



Source: Sindipeças / Abipeças (2011). Data converted to constant USD using World Bank (2011) exchange rate data and U.S. Bureau of Labor Statistics.

As noted above, the Argentinean and Brazilian automotive assembly sectors have traditionally been dominated by US and European carmakers, but the parts supply sector has been more diversified. This situation has changed dramatically over the past 20 years. As discussed in chapter 3, factors internal to the automotive value chain have squeezed profit margins and put increasing pressure on local parts manufacturers globally. These include a reorganisation of lead firms' strategies and competences such that the technological capabilities, scale and geographical reach demanded of parts suppliers have increased dramatically.

Liberalisation since the 1990s has thus exposed the technological weaknesses of the domestic parts and components firms. Investments by the multinational automakers in the region were accompanied by 'follow sourcing' strategies and a wave of mergers and acquisitions as firms with global reach sought to capitalise on the weaknesses of local firms unable to respond to liberalisation. The impact of these changes has been greater propensity to export, but also increased import penetration, as subsidiaries are integrated into global networks. Foreign firms are more likely to operate in the first tier, to forge direct links with assemblers, to import higher proportions of inputs, and to export to their 'home' region (Arza and Lopez, 2008: 109-10). Thus, denationalisation can be seen as a key causal mechanism through which the impacts of liberalisation, including the elimination of LCRs and other TRIMs, have been manifested.

In Brazil, the proportion of firms which were nationally owned fell from 75% in 1995 to 56% in 2005; more dramatically, the proportion of sales, investment flows, and investment stocks attributed to multinationals grew from approximately 50% to 88%, 77% and 79% respectively (Laplane and Sarti, 2008: 183). It is also clear that the parts and components sector has become significantly more concentrated in the past 20 years; the proportion of sales accounted for by large firms has risen from 45% in 1999 to nearly 80% a decade later; the proportion of workers employed by small- and medium-sized firms has been declining relative to employment in large

firms (Sindipeças / Abipeças, 2011: 15) and output by firms with annual revenue exceeding $150,000, as a proportion of total sector output, has grown from 45% in 1999 to 79.5% in 2009 (ibid.: 22). As Humphrey (2003: 137) notes, it is the Brazilian first tier suppliers that have lost ground. In 1995, among the 25 largest suppliers there was an even number of foreign and local firms; by 2001, eight of the twelve Brazilian firms had been sold to global suppliers (ibid.).

In Argentina, too, the sector has become more concentrated with "the disappearance of the smaller producers" (Argentinian TPR, 2007: 113) and a significant increase in the proportion of those employed by global as opposed to locally-based firms between 1996 and 2005 (Arza and Lopez, 2008: 80). "In sum, the changes observed in the last decade and a half have involved a concentration and denationalization process in the production of auto parts" (ibid.: 103, translation from Spanish original). McDermott and Corredoira (2010) indicate that between 1992 and 1999, the number of Argentine auto parts manufacturers fell by approximately 50% - suggesting that the concentration ratio within the sector has increased substantially, although there are no direct data to confirm this. At the same time, there has been a substantial denationalisation of ownership, especially within the first tier of supply. In terms of governance-related implications, McDermott and Corredoira (ibid.: 311) observe that "the technological imperative of the auto industry creates a 'glass ceiling' for upgrading in lower-tier, mainly domestic, firms as it determines the incentives and relationships that contribute to upgrading"; the domination of the higher tiers of supply by global firms thus "restricts the access that suppliers in the lower tiers have to the new information, knowledge, and development activities of the international assemblers and their allied international top-tier suppliers". Foreign firms outperform local firms, as reflected by their greater propensities to supply assemblers directly – implying dominance of the first tier of supply – as well as by higher export propensities and more advanced technological and organisational capacities. However, even the more advanced global suppliers engage only minimally in innovative activities, either in conjunction with assemblers or independently.

Thus, in addition to denationalisation and concentration that occurred in Brazil, "lower labour costs induced auto part producers to switch their operations to Brazil… At least 30 auto parts manufacturers either shut down their plants, reduced their scale, cancelled investments or moved to Brazil between 1999 and 2001" (UNCTAD, 2007: 29). In this context, LCRs – in conjunction with other unilateral policies and the delaying of intra-regional free trade[78] – were continued with the aim of preventing the further loss of parts producers to Brazil (ibid.: 33-34). Despite these efforts, outcomes have been uneven across the two countries, with Brazil "winning the regional arm wrestling to attract this type of activity to the detriment of the Argentine subsidiaries" (Arza and Lopez, 2008: 99).

Mercosur integration has enabled the establishment of a regional production network in the face of intense global competition. Weaknesses arising from suboptimal scale facilities have been partly offset through the establishment of production sharing arrangements driven by the assemblers, and have reinvigorated investment. Thus, relatively high common external tariff alongside stringent rules of origin have essentially allowed Argentina and Brazil to replace prohibited LCRs with more effective regional policy instruments. At the same time, integration has

[78] According to UNCTAD (2007: 34), "the effects of the removal of WTO notified TRIMs were partially counterbalanced by regionalization under the MERCOSUR automotive policy. The Government's main tools to keep established firms operating within the country had been the high tariff protection level granted by MERCOSUR's CET, the balanced trade requirements laid out by the MERCOSUR automotive policy, and to a lesser extent the localisation requirement".

created competition between the two countries. There are clear differences between the two countries in terms of the prospects for technological capability development and value chain governance leadership (Arza, 2011). Arguably, the divergence between Argentina and Brazil has been mitigated by the continuation of trade balancing agreements between the two countries but these have not prevented the emergence of Brazil as the dominant regional force. Unfortunately, studies pertaining to the governance-related implications of denationalisation and increased industrial concentration – in terms of strategic behaviour such as transfer pricing and leveraging rivalry between different locations to suppress wage demands – are lacking; this represents an important potential area of future enquiry.

6.4.5 Summary and conclusions

In the preceding comparison, I have sought to explain parts and components sector performance outcomes exhibited during the course of the elimination of LCRs, by examining the most pertinent causal conditions and mechanisms. As UNCTAD (2007: 35) observes, it is against a "backdrop of profound transformation that the effect of the WTO TRIMs Agreement must be analysed" in Mercosur. Profound transformation in both countries has included rapid (but extremely volatile) growth in domestic demand, prolonged macroeconomic crisis, ongoing regional institutional developments, and broader policy developments.

6.4.5.1 The contribution of LCRs to performance outcomes (RQ 2)

From the mid-1990s, LCRs were initially tied to a package of measures that encouraged assemblers to make large investments in capacity. There was a huge influx of investment in both assembly and parts, as MNCs sought to consolidate market share with productivity improvements. This investment spike tailed off rapidly with the onset of macroeconomic crisis in the late 1990s, such that a direct comparison of performance pre- and post-elimination of LCRs is problematic.

According to Laplane and Sarti (2008: 166), Brazil's export drive from 2003 was at least partly attributable to investment made in the previous business cycle, under the incentives of the automotive regime:

> The significant investment in increased capacity and development of new products and production processes, conducted in the second half of the 1990s by automakers in Brazil – and to a lesser extent in Argentina – greatly increased the competitiveness of the automotive chain. This "shock investment" imposed significant changes in the production chain and therefore the relationships between assemblers and suppliers (author's translation from Spanish original).

Indeed, Brazilian performance recovered to a large extent during the course of the 2000s, buoyed by the return of strong growth in demand which occurred in the context of the elimination of LCRs. In Argentina, LCRs followed a similar logic but in the context of less advantageous conditions than Brazil. Their role changed during the course of the period under examination, from "a set of incentives that contributed to the modernization of the industry in the midst of a favourable economic context" (UNCTAD, 2007: 35) to an interim measure aimed at cushioning the impact of economic meltdown. It seems improbable that parts and components sector output could have been maintained to the degree it has been, in the absence of mandatory and incentive based local content rules; we cannot disregard the possibility that LCRs have delayed declines and even contributed towards the achievement of greater scale economies in both countries.

6.4.5.2 The contribution of the elimination of LCRs to performance outcomes (RQ 3)

Both governments have sought to balance liberalisation with protection, including at the regional level. Argentinean automotive regime favoured firms which could export, and therefore benefitted MNCs which were affiliated with European and US firms and already integrated into global production networks. Indeed, several lead firms "imported" suppliers and this has contributed to a large and rapid rise in the imported content of finished vehicles, as the multinational suppliers themselves import a larger proportion of inputs and subcomponents (Arza and López, 2008: 100). According to Laplane and Sarti, 2008: 158), this has been exacerbated by the unequal structure of protection for assembly and parts sectors in the case of Brazil, in which the former exploit the more extensive international competition to drive down the costs of supply.

Clearly, the elimination of LCRs has exacerbated tendencies towards greater trade integration, and driven a steady increase the imported content of local vehicles, but these tendencies were already well underway as a result of liberalisation occurring in the early 1990s. In the absence of such policies, MNCs are far less constrained with respect to their sourcing, but rather than switching to foreign sources, have responded to incentives to reinforce local supply networks. Thus, although investment (and well as output) has picked up after recovery, it also seems that elimination of LCRs has contributed to increased trade propensity, favoured the consolidation of global suppliers, and led to declining trade balances.

However, substitution of national for regional policy instruments has also been a key feature of Mercosur's experience. Regional policies establishing a larger market make investment more attractive and more amenable to efficient levels of scale, while retaining a high CET and regional content requirements protects against extra-Mercosur imports of vehicles and parts respectively. However, because an arrangement of regional free trade would disproportionately benefit Brazil, Argentina has insisted on exemptions, with the threat of "wiping out Brazil's preferential access" as leverage (UNCTAD, 2007: 35). Ultimately, Mercosur has become an institution which has mitigated the decline of regional production but the delayed implementation of free trade has also mitigated divergence within the region.

Thus, the elimination of LCRs has occurred as part of the restructuring of production networks along regional, rather than national lines. The main goals for both countries have been to ensure the feasibility of vehicle assembly and keep trade deficits to a minimum. MNC assemblers have occupied a strong bargaining position, as stringent performance requirements and uncompetitive supply jeopardises the viability of the final vehicle sector. In this context, the maintenance of strong export performance indicators and relatively high local content levels suggest that the elimination of LCRs has contributed to the emergence of parts and components suppliers that are significantly more competitive on the world stage. This further suggests that the prohibition of LCRs has not been such an important loss, given the possibility of substituting policies promoting national linkages with those promoting the establishment of an integrated automotive sector for the wider region. These tendencies have favoured the expansion of Brazilian production. Recognising – in the absence of national policies such as LCRs – that an arrangement of regional free trade would disproportionately benefit Brazil, Argentina has insisted on exemptions, with the threat of "wiping out Brazil's preferential access" as leverage (UNCTAD, 2007: 35). Ultimately, Mercosur has become an institution which, via a CET and regional content rules, has mitigated the decline of regional production; but the delayed implementation of intra-regional free trade has also mitigated divergence within the region. We can tentatively conclude that the elimination of

LCRs has contributed to divergence, and would have done more conclusively, in the absence of other protective policies and resistance to intra-regional free trade on the part of Argentina.

6.5 CHINA AND INDIA

6.5.1 Overview

Broadly speaking, both the Chinese and Indian automotive sectors, including parts and components subsectors, have undergone a "remarkable transformation" over the past few decades (Sutton, 2005: 186). This transformation has involved a rapid increase in vehicle ownership and production, much greater openness to trade, and the participation of the large multinational automakers.

The restructuring of value chains to which the elimination of LCRs has contributed must be considered in the context of wider processes of liberalisation but also, crucially, the extent to which the huge and growing markets and opportunities for low cost manufacturing have presented incentives for global automakers and suppliers to establish within these markets and use them as bases to serve increasingly open market abroad, thus mitigating against the decline of local parts and components production and enhancing export performance in both cases.

While this transformation has coincided with "trade and investment liberalization policies and the global expansion of the auto industry" (Humphrey, 2003: 121), the exact role of specific policy reforms, such as the elimination of local content requirements, is unclear. As Humphrey observes in relation to developing countries in general:

> This looks like a simple story of globalization. Protected national automotive markets were opened up to global economic forces. Imports and exports of built-up vehicles increased, and the updating of both production facilities and model ranges in developing countries led to convergence across markets. Transnational companies extended their influence and integrated their global operations.

However, domestic production has remained remarkably robust in the face of trade competition; and the character of governance structures that have emerged depart from those of the previous 'closed' era without fully displacing local actors and institutions. National governments continue to influence the trajectory of the sector through a number of interventionist measures, even as overt trade barriers fall and in the face of restrictions on national policy such as engendered by the TRIMs agreement. As Noble et al. (2005: 2) observe: "WTO accession has not caused China to relinquish all instruments of industrial policy for the auto sector; Beijing still maintains a capacity to shape the development of the industry".

6.5.2 Localisation policies in the historical context of automotive sector development

6.5.2.1 Import substitution, restrictions on foreign participation, and negligible vehicle production: 1950s – 1980s

Both China and India pursued highly restrictive policy stances in the initial stages of automotive sector development, even beyond those of Argentina and Brazil; China and India also restricted the participation of foreign capital to a much greater extent and the state had a greater role in planning and rationing consumption, as it did in the economy more generally. As such, automotive production remained at very low levels until the last 20 years or so, during which time both countries but especially China have exhibited remarkable sectoral growth rates.

Unlike many of today's emerging markets, which originated in import substitution policies in the 1950s and '60s, Chinese automotive production was practically non-existent until the mid-1970s (Holweg et al., 2009). In fact, vehicle production was still negligible until the late 1980s, when the

transition from central planning to a market economy was already well underway. Until the late 1970s, the automotive sector comprised "a dispersed collection of autarchic state-owned enterprise groups operating under a centralized socialist economy to produce low-quality trucks, busses and vans in small lots for sales to government organs" (Doner et al., 2006a: 36). Chinese automotive firms were wholly state-owned, with technical assistance initially coming from the USSR. In terms of value chain structure, there were many small assemblers, far below the efficient scale of modern assembly operations at the time. Supplier relations were characterised by "high degree of vertical integration, with most of the production of components taking place within the assembly plant itself" (Holweg et al., 2009: 79). Technology was outdated, and "existing facilities offered neither the quality nor the diversity of products to satisfy the growing market" (ibid.: 80).

The reform era gave rise to new sources of demand, as a consequence of which China "imported a dozen key production technologies for heavy, light and mini-vehicles" (Sit and Lui, 2000: 663). "With the relaxation of planning, there were many more customers and the market for saloons and other vehicles increased greatly" (Holweg et al., 2009: 80). However, the policy environment was still highly restrictive throughout the 1980s, with central planning, tariffs running at 200%, strict import quotas, and limits on foreign participation. In terms of localisation policies, there were prohibitive restrictions on the importation of knocked-down kits for domestic assembly.

The Indian experience was similar. In terms of ownership, the Indian automotive sector was dominated by four nationally-owned firms (Hindustan, Premier, Mahindra and Mahindra, and Standard) from before independence until the 1980s (Kim, 2004: 249). Initially, these firms were privately owned joint ventures with foreign automakers, but were nationalised in the 1950s, at which time the government began to pursue a strategy of import substitution, and attempted to create an integrated supply sector. Besides high levels of trade protection, the Indian government implemented strict controls over ownership of automotive firms as well as the nature of production. Foreign ownership was prohibited entirely in the assembly sector and restricted in the components sector (Humphrey and Salerno, 2000: 153). Production of passenger cars was discouraged in favour of agricultural and commercial vehicles. As part of an overall strategy of import substitution, a "significant portion" of local component production was reserved for small, locally owned businesses. "Under this policy, from the mid-1960s, auto manufacturers were not permitted to expand their internal components-manufacturing capacity, and instead were required to purchase a number of components from these small, independent components suppliers" (Kumaraswamy et al., 2012: 371).

Vehicle production remained very modest throughout the 1970s and '80s, even accounting for low levels of income (see table 6-12, below). In China, "the number of imported cars was higher than that of domestically produced cars" by a multiple of almost nine (Sit and Lui, 2000: 659). Although accurate data are not accessible, it is likely that black market automotive imports exceeded legal imports by the mid-1990s (ibid.). In any case, in both countries, export-oriented production was practically non-existent, and the Chinese and Indian auto sectors were behind the international technological frontier by orders of magnitude.

In India, the automobile sector was "very fragmented, with low production volumes, predominantly low-skilled labor, low technological intensity and low quality" (Kumaraswamy et al., 2012: 371-372). In China, too, technology was outdated, and "existing facilities offered neither the quality nor the diversity of products to satisfy the growing market" (ibid.: 80).

6.5.2.2 Modernisation and foreign technology: 1980s – early-1990s

The first steps toward modernisation in India began with the establishment of a joint venture between a nationalised automaker, Maruti Udyog, and the Japanese firm Suzuki in 1981 (Kim, 2004: 250), after years of stagnation and technological retardation in which the biggest selling passenger vehicle was essentially a 1960s Morris Oxford (Sutton, 2005: 186). Maruti came to

dominate the car sector in the coming years, capturing over 70% of car sales by the early 1990s, although this share has since declined (Nag, 2011: 115). The firm brought in Japanese technology and forms of supply chain governance, working with both independent Indian firms and in-house subsidiaries; "in both cases Suzuki-Maruti worked with suppliers to establish international best practice and achieve high levels of productivity and quality" (Sutton, 2005: 186). A substantial network of suppliers developed around the firm's base in New Delhi (ibid.; Kumaraswamy et al., 2012).

Table 6-12: Production of cars and jeeps (India) and cars and commercial vehicles (China): selected years.

Year	India	China
1970	-	87
1971	49	-
1980	46	222
1983	67	240
1990	219	509
1991	209	709
1992	192	1062
1993	244	1297
1994	286	1353
1995	393	1453
1996	472	1475
1997	486	1583
1998	458	1628

Source: India: ACMA cited in Humphrey and Salerno (2000: 152); China, 1970: Holweg et al. (2009: Table 3); China 1980-1998: Noble et al. (2005: Table 1).

The first meaningful step towards the development of the modern passenger car sector in China began with the approval for the participation of VW in a joint venture in the mid-1980s, which was eventually established in 1991; previous joint ventures had largely met with failure (Noble et al., 2005: 5-6). Prior to this, in 1988, the government had sanctioned six state-owned assemblers to form joint ventures with foreign capital, of which Shanghai-VW was the most successful (Sit and Lui, 2000: 662). This restructuring, and the removal of production restrictions, led to an increase in the production of cars as a proportion of total vehicles, from 2.4% in 1980 to 31.2% in 1998 (ibid.).

6.5.3 The elimination of LCRs and other drivers of parts and components sector performance in the post-WTO era

6.5.3.1 LCRs in the context of ongoing liberalisation: 1990s – early 2000s

India began the process of automotive liberalisation in earnest in 1991, deregulating the parts and components sector, with new firms allowed to establish production and form joint venture in the 1980s and assemblers licensed to enter into partnerships with local suppliers in 1991 (Kim, 2004: 250; Kumaraswamy et al., 2012: 372). Liberalisation continued with the delicensing of the assembly sector, to which Nag (2011) attributes the entry of "many global players". In the assembly sector, Indian firms Telco (now Tata) and Bajaj Tempo were licensed to enter the passenger car markets; this was followed in fairly quick succession by the entry of 10 global automakers: Daewoo, Mercedes, Fiat, GM, Ford, Honda, Mitsubishi, Peugeot-Citroen, and Toyota (Kim, 2004). Most of these firms established joint ventures with local firms, although this was not an explicit requirement. Initially, foreign equity was limited to 51% but this was soon raised to 100% for approved projects (Indian TPR, 1998: 146). In India, between 1990 and 2001, the market

shares of the subsidiaries of global automakers climbed from zero to 27% while those of the struggling Indian brands Mahindra and Mahindra, Hindustan Motors and Premier dropped by over 30 percentage points to rather negligible levels. Nevertheless, production volumes remained low in most of the new entrants, as a result of weak domestic demand (Kim, 2004).

As well as opening up to foreign capital, India rapidly liberalised its import regime during this period. However, sufficiently high tariffs were retained to encourage local production and inward investment: India "imposed a punitive tariff rate of 132 per cent on imported cars at the time of deregulation, which effectively banned the import of foreign cars and pressed global firms to develop their supplier bases in India. The high tariffs on finished automotive components also forced these foreign companies to source components from local suppliers" (Kim, 2004: 255). In addition, in the early 1990s India did not impose specific localisation targets or LCRs per se, but initially banned the importation of 'knocked down' kits. Perhaps more importantly than the level of tariffs, vehicle imports continued to be subject to discretionary import licensing (Indian Trade Policy Review, 1998: 147), while investment projects were subject to discretionary approval mechanisms, through which local content was promoted on an *ad hoc* basis, as discussed below.

For China, the most significant shift in policy stance came with the implementation of the Automotive Industrial Policy (AIP) in 1994. The stated aims of the policy were fourfold: to establish large-scale groups of saloon and light truck producers (to replace the small-scale, scattered manufacturers); to improve the components industry; to create automotive product development capabilities; and to encourage individual car ownership (Holweg et al., 2009).

It was recognised that foreign participation and modernisation of planning systems were both required to achieve these goals. However, in comparison to India's opening to foreign capital, the Chinese approach to liberalisation was more tentative and gradual; the government has engaged in reform "which has resulted in a mixed regulation mechanism composed of both market competition and legacies of the past command economy" (Sit and Lui, 2000: 653). Whereas in India all of the main global automakers established subsidiaries in the early 1990s, China had only authorised the entry of one additional assembler, Shanghai-GM, by 1998 (ibid.: 662).

Towards the turn of the century, China authorised the establishment of numerous additional FDI projects Wang (2003: 291) reports, the vast majority of FDI was subject to a "mandatory equity share regulation" as well as vigorous screening process. These have permitted the Chinese state to ensure that MNCs were "complementary (but not dominant) sources of capital" (ibid.: 293). Alongside joint ventures were private, locally state-owned and centrally state-owned Chinese firms. As Thun (2004) discusses, policies and institutions at the local (regional) governmental level have also played a crucial role in determining the location of production and FDI inflows. Together, these features preserve the idiosyncratically Chinese characteristic of the automotive value chain.

As in India, levels of trade protection were considerably reduced but remained high throughout the 1990s. The Automotive Industrial Policy also specified that assemblers adhere to demanding local content ratios, enter into mandatory joint ventures with Chinese firms, and transfer technology to subsidiaries and partners. Local content requirements were set at 40% in the first year, increasing to 60 then 80% in the second and third years respectively.

Details regarding the vehicle output and local content levels attained by the major Chinese vehicle assemblers in 1998 are shown in table 6-13, below. It is apparent that by the mid- to late-1990s, most Chinese-manufactured vehicles had achieved the required level of local content, at around 85% in most cases (Sit and Lui, 2000: 662). Despite serious issues with productivity levels and the attainment of quality standards, LCRs "required the carmakers to switch rapidly from reliance on imported components to sourcing from local vendors; this in turn gave the carmakers a strong incentive to work closely with (first-tier) suppliers to ensure that quality standards were met, within an acceptable price" (Sutton, 2005: 186).

Table 6-13: Major car assembly plants in China in 1998

	Car production	Local content of major models
Shanghai-VW Co. Ltd.	235,000	84.0-91.7
Tianjin Automobile Plant	100,021	93.3
Beijing Jeep Co. Ltd.	8,344	82.3
FAW-VW Co. Ltd.	66,100	84.03
FAW	15,026	82.2
Chang'an-Suzuki Co. Ltd.	35,555	85.28
Shenlong-Citroen Co. Ltd.	36,240	67.5-82.2
Shanghai-GM Co. Ltd.	Started commercial production in 1999	N/A
Guangzhou-Honda Co. Ltd.	345	N/A

Source: Sit and Lui, 2000: Table 3. Note: Guangzhou-Honda previously Guangzhou-Peugeot before the withdrawal of PSA.

In India, performance outcomes improved dramatically, and the value of parts and components production roughly tripled between 1991 and 1996 (Indian TPR, 1998: 147). There was also some modest export success, with the ratio of exports to output reaching over 20% in 1996 (ibid.: 146). However, it should be noted that at this stage, such exports "were targeted primarily at the lower-quality after-markets" (Kumaraswamy et al., 2012: 373).

In India too, once foreign ownership was permitted, the structure of the value chain began to change. Components production had been carried out predominantly in-house by locally-owned subsidiaries or independent firms. There were substantial problems with quality, as in China, and, as Veloso and Kumar (2002: 27) note, "it is not surprising to find most foreign automakers to be unsatisfied with Indian component manufacturers". LCRs have contributed to the decisions of multinational assemblers and suppliers to invest heavily in the parts and components sector, and of local firms to engage in technological upgrading; "leading local firms have established over 200 technical cooperation agreements with foreign firms to be able to reach international standards" (ibid.). Thus, with liberalisation, a more mixed network of suppliers began to emerge, with assembler-established joint ventures and global tier-one suppliers joining the established Indian firms (Nag, 2011: 106; Sutton, 2005: 186), but local content levels remained high. The injection of competition caused by the entry of the global automakers gave rise to further developments in the nature of value chain relationships, with a wave of joint ventures as well as wholly-owned foreign suppliers being established, putting local manufacturers under greater pressure. "A number of components manufacturers with global reach have invested in India to serve their assemblers' local operations" (Kim, 2004: 252). As Kumaraswamy et al. (2012: 373) note,

> aggressive local content requirements meant that MNE auto manufacturers and MNE Tier 1 firms had to develop local sources for a number of components... To ensure that their global standards were met in the Indian market, MNEs had to engage in close interactions and joint efforts with local suppliers to improve quality and productivity. Domestic auto manufacturers also began establishing closer relationships with their suppliers, in contrast to their earlier arm's length and price-based dealings" (p. 373).

According to Sutton's (2005: 187) summary, during the course of the 1990s, in both countries

> the supply chain underwent a major transformation. The new generation of multinationals worked closely with local suppliers to achieve high standards of productivity and quality. Meanwhile, domestic carmakers faced intense competition for market share. Their response was to upgrade productivity and quality levels in their own plants and to look for higher quality levels from their (first-tier) suppliers.

Thus, it appears that LCRs have been an effective tool – in the context of rapid growth in demand, wider processes of liberalisation, and oligopolistic competition between the major automakers – for promoting technology transfer and upgrading within automotive parts and components suppliers.

6.5.3.2 The elimination of LCRs

The strategies described above can be seen as preparation for engagement with the multilateral system established by the WTO in 1995. India was a member from the beginning, but did not notify its localisation policies under the terms of the TRIMs agreement. As noted above, the government originally banned the newly arrived MNC assemblers from importing parts and components, including 'completely knocked down' (CKD) and 'semi knocked down' (SKD) kits, in 1992. However, this was soon relaxed, in 1995, in favour of individual Memoranda of Understanding (MOUs) with MNCs which stipulated local content, trade balancing and production volume requirements and "imposed high customs duties on imported CKDs and components until MNE entrants fulfilled their commitments" (Kumaraswamy et al., 2012: 373). India and the EU initially came to a mutual agreement that the measures would be phased out by the end of 2003. Instead, in 1997, these *ad hoc* agreements were replaced with a uniform policy, comprising local content requirements rising from 50 to 70% within five years as well as foreign exchange balancing requirements which required exports to compensate for imports (WTO document WT/DS146/R).

This policy was subject to dispute proceedings by the EU and US and Japan starting in October 1998 (WTO dispute cases DS146 and DS175) on the grounds that the measures contravened the TRIMs agreement and other WTO provisions. In a judgement that effectively superseded the mutual agreement between the EU and India, India was required to eliminate the current system of non-automatic licenses for imports of passenger cars, and chassis and bodies therefor, no later than 1 April 2001.

The Chinese experience was different but resulted in a similar outcome: the elimination of LCRs by 2001, at least in formal terms. China was not an original member of the WTO and had had to satisfy a number of domestic reform criteria before being permitted to accede, which it finally did in November 2001. Regarding LCRs, China was not permitted recourse to the phase-out period that applied to other developing countries joining the organisation in 1995, and had to comply with additional policy space restrictions to those relating directly to trade (WTO document WT/L/432).

An important factor to consider in the present analysis is that China continued to implement prohibited TRIMs for some time after the formal elimination of LCRs, as noted in section 3.5.4. The details of the policy and the subsequent dispute case are complex, but basically, China imposed fiscal penalties on firms using knocked down kits if the latter were deemed to have the "essential characteristics of complete vehicles". The complaints of the US, EU and other complainants were upheld, and China was required to remove the measures in question. Beyond this, according to Haley (2012: 28),

> Officially, Chinese law contains no local-content requirements either regionally or nationally in any sector. The reality in the auto-parts industry appears somewhat different… Specifically, local-content requirements continue unofficially and informally… as undisclosed rules for the approval of foreign-investment projects.

Noble et al. (2005: 15) concur, reporting that foreign investors "perceive that the desire of authorities to increase local content colors official response to investment proposals and has

amounted to an informal imposition of WTO-outlawed TRIMs". According to the Haley, such informal discretionary mechanisms have met with a degree of success as investors "have responded to Chinese persuasion on local content" (2012: 29).

Besides the fact that China has continued to employ prohibited TRIMs, both formally and informally, after its accession to the WTO, there have been a number of similarities in China and India's policy stances. Appendix 27 summarises the main policy developments affecting the automotive sector.

Both countries have courted FDI, engaged in trade liberalisation, and continued to promote the automotive sector, but in different ways and with varying degrees of success. Throughout the 1990s, India continued to implement high tariffs on vehicles – indeed tariffs were increased between 1997 and 2002 – as well as taxes that raise the cost of vehicles by between 65 and 75% of the manufacturing cost (Indian Trade Policy Review, 2002: 109).

However, Indian automotive policy changed to a more 'market-friendly' variety following the period in which LCRs were eliminated. The stated goal of 2002's Automotive Policy was "to develop India as a global hub for small cars and an Asian hub for auto components" (Kumaraswamy et al., 2012: 381). The policy focused on incentives for the production of small cars, leading to export success by a number of automakers – including the Indian firm, Tata Motors – and the Core Group on Automotive Research and Development (CAR) was established to identify priority areas for research and development (Nag, 2011: 102). In addition, 100% foreign ownership was permitted in both assembly and supply. According to Nag (2011), this policy "finally led to the reduction of duties in the auto component sector to a large extent and the automobile sector to some extent". As a result, tariff on vehicles fell from 44.2 to 33.6% between 2002 and 2007 (Indian Trade Policy Review, 2007: 125). Nevertheless, given the level of such tariffs, it remains "likely that much of the FDI in the industry is for "tariff jumping" purposes", at least in the assembly sector (ibid.). Parts and components tariffs have been reduced even more dramatically, falling from 35% in 2001 to 12.5% in 2007.

Notwithstanding the measures described above, China has also gradually and profoundly liberalised tariffs. The average applied tariff fell from 30.1% in 2001 to 14.8% in 2005. The Chinese state has used the considerable leverage of the domestic market to encourage technology transfer and limit denationalisation of ownership through joint venture requirements and other means. According to Noble et al. (2005), the government

> moved towards a lighter-handed but more effective form of industrial policy that reduced top-down planning while expanding market incentives and scope for managerial freedom. Rather than destroying industrial policy for the auto industry, WTO accession constrained and disciplined it.

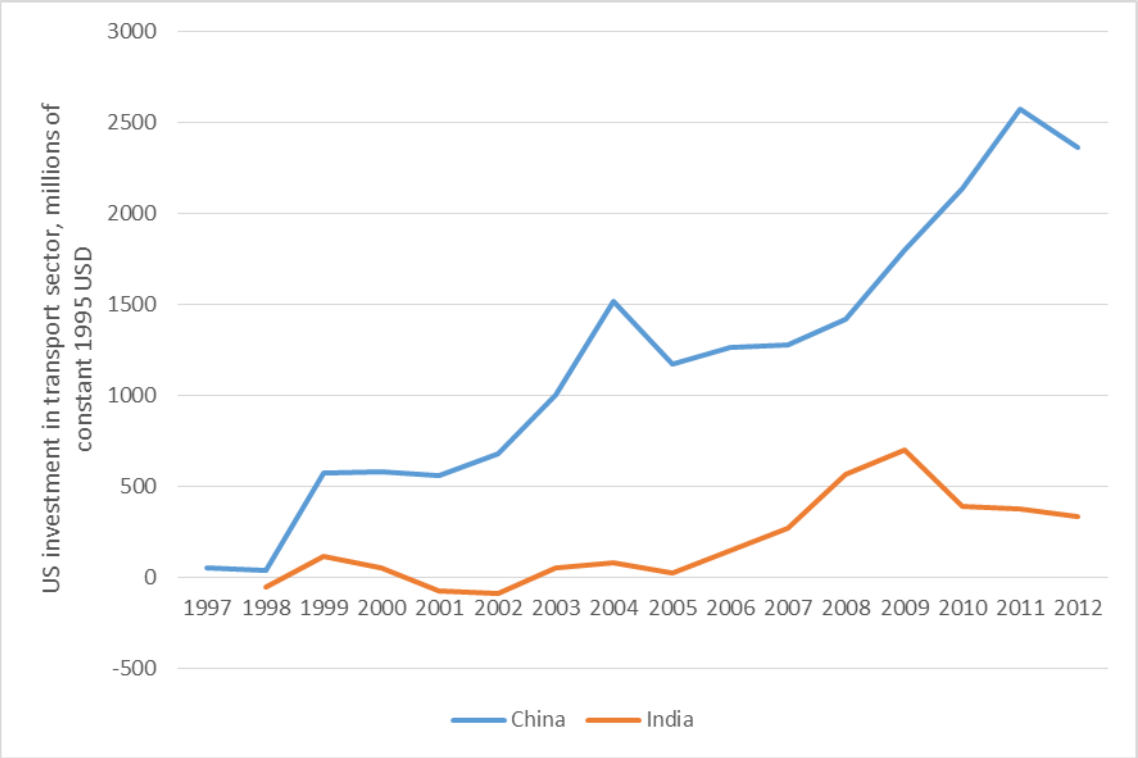
In 2004, the new Automotive Industrial Policy introduced investment performance requirements stipulating that foreign investment projects had to invest at least RMB 500 million in research and development, agree to transfer technology to local subsidiaries, and launch new brands in China. A 50% foreign equity limit was imposed on all automotive firms; this was eliminated in 2004 for parts and components firms but remained in force for the assembly sector. China has fostered its own 'national champions' by encouraging joint ventures between foreign technology-owners and state-owned conglomerates, as well as providing billions of dollars in subsidies and "extensive institutional support for the acquisition and development of cutting-edge technology, including new energy and green technologies" (Haley, 2012: 1).

6.5.4 FDI and value chain governance structures

The Indian and Chinese automotive sectors have both transitioned from small, backwards national concerns to large, modern globalised industries over the past 20-25 years. There have been a number of similarities in the manner of their transformations that stand in contrast to the experience of other, smaller emerging markets. One obvious commonality is the increased involvement of foreign capital and technology – in both wholly-owned foreign enterprises and joint ventures – amidst the success of a small number of local firms. In both countries, global automakers have committed to integrate local production into their global sourcing strategies, encouraging the global suppliers to follow them to the expanding markets. Competitive pressures, including the reduction of trade barriers generally and the elimination of LCRs specifically – have led to the gradual dominance of the supply sector by foreign capital and greater export propensity, but have not significantly reduced levels of local content. At the same time, a collection of more capable domestic firms have managed – to a greater or lesser degree – to coexist with the multinationals and ultimately, to compete on the world stage, either independently or as joint ventures.

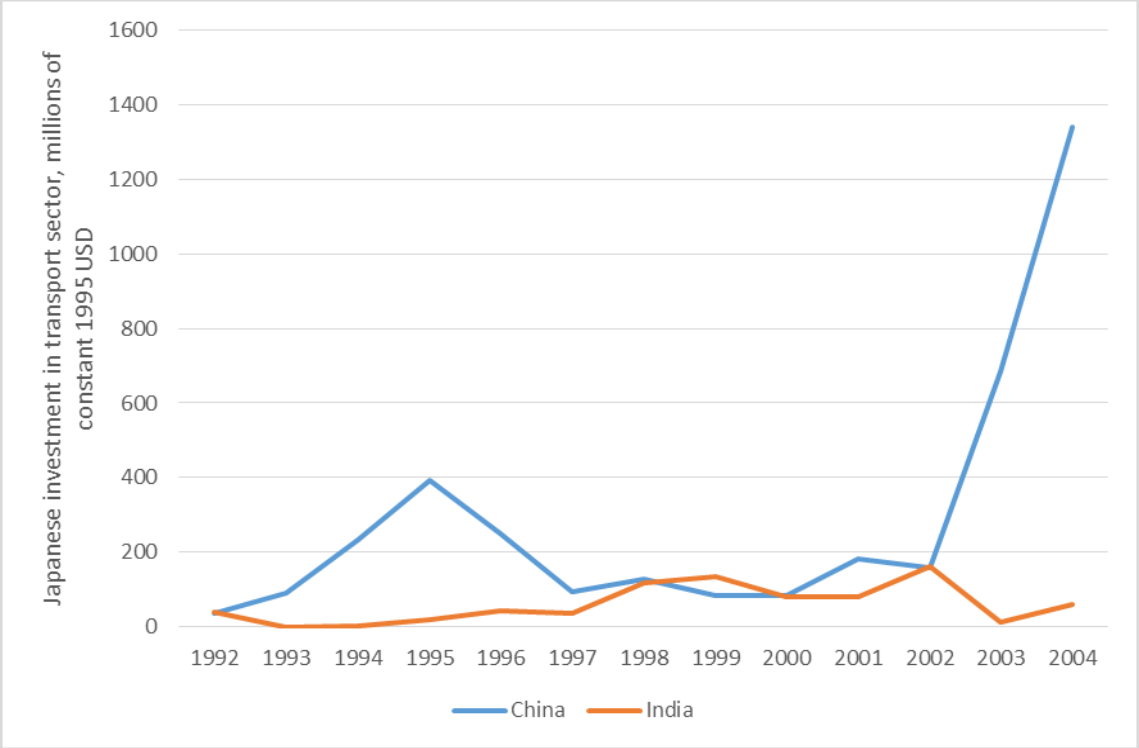
With respect to FDI inflows, figure 6-20 shows that US investment to China and India was initially approximately equal but has diverged significantly in more recent years. Looking at Japanese investment into the transport sector, shown in figure 6-21, a spike in investment following the Chinese *AIP* of 1994 and the initial wave of liberalisation is clearly visible. In the late 1990s, investment levels in China and India converge, before another spike following China's entry into the WTO results in a large divergence. Although data on Japanese transport FDI into India are not available beyond 2004, other sources suggest that a large gap in inward investment persists throughout the 2000s.

Figure 6-20: US investment in transport sector, millions of constant 1995 USD: China and India, 1997-2012.



Source: US Bureau of Economic Analysis (2015). Data converted to constant USD using World Bank WDI exchange rate data and U.S. Bureau of Labor Statistics.

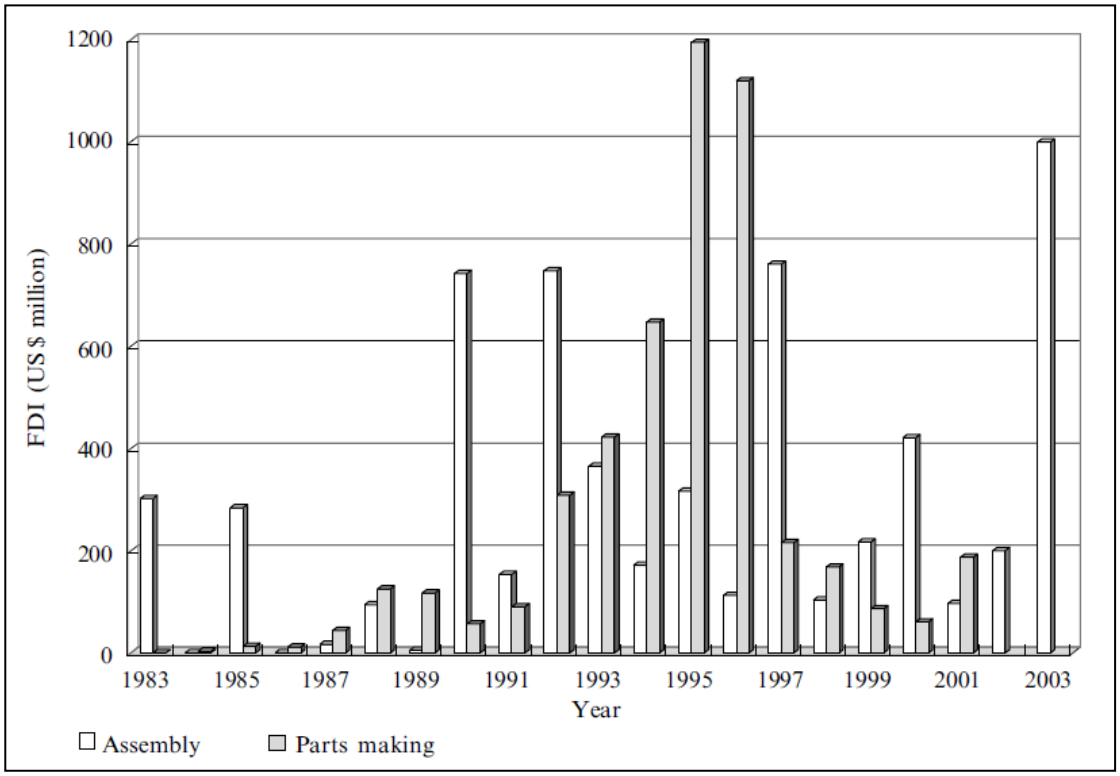
Figure 6-21: Japanese investment into the transport sector, millions of constant 1995 USD: China and India, 1992-2004



Source: 1989-2004: Japanese Ministry of Finance (2015) data based on international transactions in securities reported by major investors (series discontinued in 2004). Data converted to constant USD using World Bank WDI exchange rate data and U.S. Bureau of Labor Statistics.

As the big multinational automakers have clamoured to gain access to these large and growing markets, especially in China, their entry has brought similar levels of investment in the supply sector. Liu and Dicken (2006: 1233) analyse FDI into the Chinese auto sector in the years prior to and following the AIP of 1994. They observe that initially, the majority of FDI was into the assembly subsector. Following the decision in 1994 to limit further assembly operations and increase localisation, FDI flows shifted to the parts supply subsector, as shown in figure 6-22, below.

Figure 6-22: FDI into the Chinese assembly and parts sectors, millions of USD: 1983-2003.



Source: Liu and Dicken, 2006: Figure 1.

As Noble et al. (2005: 7) comment, the main effect of 1994's AIP was "competitive rush by foreign auto assemblers and parts firms to enter the Chinese market and to establish a favorable position before China entered the WTO". China's strong bargaining position has encouraged these automakers to commit to establishing integrated production systems in China, rather than mere assembly plants to service the domestic market, in line with the developmental goals of the Chinese administration. For example, when China permitted the establishment of a huge joint venture between GM and Shanghai automotive, "GM had already proven its commitment to China's long-run development by establishing over a dozen parts plants in China, many of them oriented to exports" (ibid.). The influx of competition and the quality standards of the incoming foreign automakers encouraged local suppliers to engage in rapid upgrading by licensing technology from abroad or themselves engaging in joint ventures with global suppliers. According to Noble et al. (2005: 20), these investments were motivated by "using China as a means to cut production costs in their global supply chains" as well as to access the rapidly growing market, the size of which, by the mid-2000s, was beginning to permit the exploitation of "economies of scale and (particularly around Shanghai) agglomeration".

After China's entry into the WTO in 2002, almost all the remaining global automakers entered China, accompanied by global parts suppliers. Cooney (2006: 16-17) observes that "as international automakers increase their manufacturing investment and sourcing in China, they will be seeking ways to integrate parts supply capacity, from their own operations or from third parties, into their global business". Already by 2005, "more than 70% of the global top 100 suppliers were operating in China" (Holweg et al., 2009: 98).

By comparison to their assembly sectors, both India's and especially China's parts and components sectors are highly fragmented. Holweg et al. (2009) put the number of Chinese parts firms at approximately 1700 in 2004, while A. T. Kearney (2008) state the figure as 12,000

(presumably due to definitional differences in reported data). Regardless of the exact number, it is clear that while both "are still highly fragmented, with large numbers of small competitors… the Chinese market is more fragmented overall… the top 10 suppliers in India account for 31 percent of the market, in China the top 10 suppliers comprise just 18 percent." (ibid.: 4). Similarly, Sutton reports that the top 10 exporting firms account for 39% of exports in India compared to just 14% in China. However, comprehensive data on industry concentration, permitting inter-temporal comparison pre- and post-elimination of LCRs, are not available. Similarly, detailed data on the governance-related implications of changes in market structure and ownership patterns are lacking, presenting an important gap in the literature.

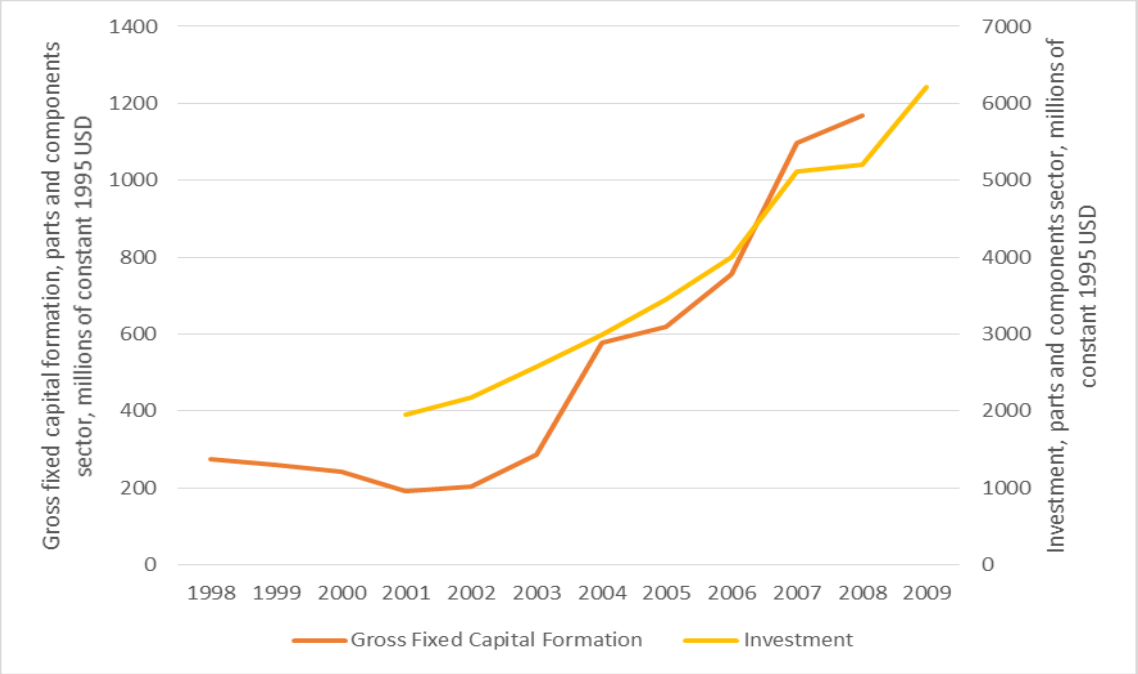
In China, as demonstrated by Liu and Zhao (2006) and Holweg et al. (2009), foreign-affiliated firms were larger in scale, exhibited higher levels of productivity, and dominated the first tiers of supply. Having developed a model of production incorporating micro-level (firm) data on scale, ownership, and factor inputs, Liu and Zhao (2006) report that productivity rose rapidly between 1999 and 2004, with foreign-affiliated firms performing at higher levels. However, the authors acknowledge that locally-owned private and state-owned firms have also exhibited rapid rates of productivity growth by "introducing new technology and advanced management from foreign countries" and "through imitation of new technology and innovation" (ibid.: 13). Overall, while it appears clear that there has been a substantial denationalisation of ownership, Chinese firms still represented the majority of equity ownership in the sector at this stage. Furthermore, according to Haley (2012: 8),

> direct and indirect Chinese government ownership or influence remains prevalent. Many of the large auto-parts companies have affiliations with the large vehicle-assembly groups that local governments partly own. Other unaffiliated auto-parts companies benefit from government ownership directly… Most foreign auto-parts companies have entered China through JVs with local and regional governments, thereby securing access to government equity capital as well as near-guaranteed access to preferential bank loans.

China has been able to been able to maintain local content through its influence over local automakers – whose relationships with existing suppliers grant implicit protection. Thus, some indigenous Chinese automotives firms have been as exception to the tendency, in other emerging markets, in which domestic firms are either subsumed by MNCs, exit the industry, or drop to lower tier production. Thus, as Haley (2012: 2) notes, "a number of Chinese domestic enterprises are emerging as world-class competitors". Due to the lack of data, it is not clear whether the industrial structure has become more concentrated over time in the Chinese parts sector, although this is likely to have been the case due to the extremely fragmented market structure prevailing in the 1990s coupled with an influx in competition.

The story – of a rapid influx of foreign investment coupled with denationalisation – is similar in India, although the size of the market remains small in comparison. A number of global parts and components firms had already followed the assemblers to the newly open Indian market in the early- to mid-1990s (Humphrey, 2003). As Rasiah and Kumar (2008: 85) show, foreign parts and component manufacturers "enjoyed higher labour productivity, wages, and export, technological and skills intensities than local firms". The presence of these firms has therefore contributed to the export performance of the supply sector, as well as pressuring the rapid adjustment of the indigenous suppliers. As liberalisation continued, especially with the elimination of LCRs in 2001 and the liberalisation of investment that came with the following year's Auto Policy, investment in the Indian parts and components sectors expanded rapidly, as shown in figure 6-23, below.

Figure 6-23: Investment and Gross Fixed Capital Formation in the Indian automotive parts and components sector: 1998-2009.



Source: Gross Fixed Capital Formation data from UNIDO (2011), investment data from ACMA (various years). Data converted to constant USD using World Bank WDI exchange rate data and U.S. Bureau of Labor Statistics.

In addition, governance structures became increasingly denationalised. As Humphrey (2003: 137-8) observed in 2003,

> there are clear indications that transnational auto component manufacturers are increasing their stakes in their Indian joint ventures. What were once minority stakes are now being transformed into majority stakes. Equity tie-ups are increasingly necessary for Indian companies wanting access to technology and designs that are essential for gaining contracts, but the price for this technology is frequently the ceding of a majority stake to the foreign partner.

A number of local firms left the market while others "such as the TVS Group, the Rane Group and the Kalyani Group have successfully forged strong Tier 1 relationships with domestic and MNE auto manufacturers, and have become integral parts of the auto industry's global supply chain" (Kumaraswamy et al., 2012: 390). Some Indian suppliers were already exporting unsophisticated components to less developed markets, but as liberalisation proceeded and competition intensified, "there was a slow but sure shift to exports of quality components to MNE auto manufacturers and global Tier 1 components firms" (ibid.: 387).

Interestingly, although comprehensive longitudinal data are not available, in India the influx of foreign investment may have resulted not in consolidation but increased fragmentation of the parts and components sector, due to the increased numbers of participants in the assembly sector and the follow sourcing strategies of global suppliers[79]. Thus, analysts such as

[79] According to Humphrey (2003: 137), this phenomenon is well illustrated in the case of brakes suppliers. As he observes, "prior to the 1990s two companies dominated the Indian market for this product: Brakes India (a joint venture between the UK company, Lucas, and an Indian conglomerate, TVS) and Kalyani Brakes…. In the 1990s, at least two other braking companies entered the Indian market… At various times two further companies… were encouraged to enter the market as follow sources by their customers".

Kumaraswamy et al. (2012: 390), drawing a contrast with the fate of Latin American and Eastern European supply sectors, “cautiously forecast that several domestic firms will continue to compete successfully in the Indian and regional auto components markets alongside MNEs”. Nevertheless, as the authors acknowledge, further “consolidation of the industry is likely to occur, as competition increases from China and ASEAN countries, and auto manufacturers in India further rationalize their respective supply chains” (ibid.).

6.5.5 Summary and conclusions

6.5.5.1 The contribution of LCRs to performance outcomes (RQ 2)

Coming in the context of wider liberalisation (which could have easily threatened local suppliers) and simultaneously with large-scale investments in productive capacities of the global automakers, Sutton (2005) reports that firms have established local sources of parts and components superior in price to the imported alternative, suggesting “development of the local supply chain under local-content restrictions in the years before WTO entry has been highly successful” (p. 198). There were rapid increases in productivity among local firms alongside a wave of investment by global assemblers and suppliers.

In China, LCRs were implemented in the early phases of sectoral development, which by the 1990s was characterised by immense potential for growth amidst stagnating mature markets in ‘the quad’. Foreign auto producers were desperate to gain a foothold in the vast protected market, and the Chinese government were able to negotiate local content levels which MNCs could only fulfil by establishing mandatory joint ventures or transferring technology directly to local firms. As a result, when LCRs were eliminated, foreign MNCs had already established production networks in which local firms were integrated. The latter, crucially, were able to ‘learn-by-doing’ over the course of the decade. Global parts and components manufacturers have invested heavily as an export platform China to take advantage of low wages. In India, too, LCRs had the desired effect, with a combination of global and local firms rapidly upgrading in order to meet the demands of MNCs under intense competitive pressure. However, because the Indian market was not poised for such high rates of growth as was China, investment in the supply subsector remained at relatively low levels until the early 2000s.

6.5.5.2 The contribution of the elimination of LCRs to performance outcomes (RQ 3)

In both countries, elimination of LCRs appears to have contributed to the further denationalisation of parts and components supply chains, but also further investment and better export performance as local firms reorient to take advantage of global markets, and multinational firms continue to integrate their operations into global sourcing strategies. Importantly, local content ratios remain extremely high, suggesting that assemblers prefer domestic suppliers either due to pure cost advantages or because the costs of switching to foreign suppliers are too high. In the latter case, successful and long term indigenisation appears to be at least partly aided by the implementation of LCRs in the infant industrial phase.

It is clear that policies and institutions have continued to play a significant role throughout the rapid expansion and upgrading of parts firms in both countries. Trade liberalisation has been implemented gradually to allow adjustment to competition, and while FDI has been courted, both governments have tried to use their advantages as leverage to encourage local sourcing, technology transfer, and joint ventures. China, in particular, has used its vast domestic market to bargain with foreign capital:

> By 2003 all of the world's leading automobile producers had established production facilities in China in various forms. To varying degrees, therefore, China's automobile industry is becoming integrated into the global production networks of transnational corporations. But

> so far… this has been, to a very considerable degree, on terms dictated by the Chinese government (Liu and Dicken, 2006: 1229).

Denationalisation of the supply chain has occurred, but has been mitigated by the policy and institutional environment so that a proportion of domestic firms have emerged as globally-competitive suppliers. Formal and informal performance requirements have continued after the elimination of LCRs – especially in China. It is impossible to discount the possibility that continued protection and other supporting policies have mitigated the impacts of the prohibited TRIMs, particularly in the Chinese case, as suggested by Noble et al. (2005) and Haley (2012).

To the extent that the two countries have diverged with respect to trade performance, divergence appears fairly modest and largely explained by the obvious difference in market size. China has opened up a large trade surplus in parts, but India has emerged as an exporter of finished vehicles – including indigenous brands – which contain high proportions of Indian parts and components. In conclusion, the elimination of LCRs has been one part of both countries' sequenced strategies to develop globally competitive automotive sectors, has contributed to the surge of investment in the 2000s, and has been accomplished without any significant decline in parts and components output or disproportionate increase in the propensity of assemblers to sources inputs from abroad.

7 SYNTHESIS OF FINDINGS, DISCUSSION AND CONCLUSIONS

7.1 CHAPTER OUTLINE

The purpose of this final, concluding chapter is to summarise the findings of each stage of my research individually, synthesise and assess their joint contribution, and discuss the wider relevance, applicability and implications of the thesis as a whole.

The chapter is structured as follows. In section 7.2.1, I briefly summarise the findings of chapters 5 (which were already addressed extensively in section 5.5) in relation to RQ 1. In section 7.2.2 I synthesise and expand on the findings of chapter 6 by comparing the pairs of cases analysed therein with the aim of generalising about the nature of the causal mechanisms driving the impact of the elimination of LCRs on performance outcomes. Section 7.2.2 is concerned with addressing the substantive concerns of RQs 2 – 3 and the associated sub-questions. Throughout both sections, I assess the extent to which the research questions have been adequately and comprehensively addressed, the limitations of each method in terms of causal inference, and issues of generalising the findings more broadly.

These issues inform my response to subsequent discussion of research questions concerning the methodological and wider theoretical implications of the research. In section 7.3, I assess the joint contribution of the mixed method approach, in terms of the relative insights afforded by each stage to my overall research problem, and provide a response to RQ 4 and sub-question 4.1. In particular, I discuss the methodological difficulties in isolating the phenomenon under examination from wider contextual factors affecting performance outcomes which vary at the country and regional levels and over time, which ultimately, I have found to be impossible to completely overcome. Following from this discussion, I identify a number of ways in which alternative methods and empirical approaches could fruitfully contribute to a greater understanding of the impacts of the elimination of LCRs.

Finally, in section 7.4, I discuss the wider implications of my research to wider theoretical debates, discuss some tentative policy implications that arise as a result of my findings, and consider avenues for future research.

7.2 SUMMARY AND DISCUSSION OF SUBSTANTIVE FINDINGS

In this section, I briefly summarise the findings of chapters 5 in relation to RQ 1, the research question is was designed to address, and synthesise and expand on the findings of chapter 6 by comparing the pairs of cases analysed therein. Throughout the discussion, I assess the extent to which the research questions have been adequately and comprehensively addressed, which informs my response to subsequent discussion of research questions concerning the methodological and wider theoretical implications of the research.

7.2.1 Panel regression

The research question pertaining to the panel regression stage of analysis was as follows:

> RQ 1. What is the nature and magnitude of the impact of the elimination of LCRs on quantitative indicators of industrial performance in the automotive parts and components sector?

The main estimation results showed that while local content levels have fallen as a result of the elimination of LCRs, output did not fall significantly, and at the same time, both imports and

exports have increased fairly dramatically. The implications are that the elimination of LCRs has led to the development of less internally integrated, but more internationally competitive, parts and components sectors in the liberalising countries. On balance, given the clear advantages of integration into global production networks – as reflected by the stated goals of countries pursuing LCRs – it can be confidently stated that the elimination of LCRs has caused an important improvement in industrial performance outcomes, against the more pessimistic theoretical predictions that liberalisation would cause a rapid influx in imports and the rapid disintegration of local supply networks as assemblers source from existing networks or relocate to more advantageous locations[80]. This appears, at face value, to refute structuralist expectations that policy space restrictions impose significant costs on developing countries by hampering structural transformation, in the instance of the elimination of LCRs. Since LCRs were considered to be an important and controversial aspect of policy space, this finding represents an important contribution to debates surrounding the developmental effects of policy space restrictions. The validity of the finding is enhanced by the incorporation into the fixed effect DID model of covariates for market size and industrial capabilities, and, in additional specifications, of covariates incorporating the effects of tariff levels, the presence of regional trade institutions, and region-specific year effects (to capture the heterogeneous time-varying factors at the regional level, such as uneven growth patterns, or financial contagion, for example). Furthermore, I carried out analysis on two separate samples – major automotive producers and a wider sample of countries for which data were available – and I constructed alternative indicators for each variable of industrial performance outcome in which I was interested. The consistency of the findings depicted above across the alternative models serves to confirm that the reported results are satisfactorily robust.

Nevertheless, I recognise a number of limitations to the method implemented here, as discussed in section 5.5. In principle, and under stringent assumptions, the DID estimator should identify an average causal effect. However, there are reasons to believe that these assumptions may not pertain. In the presence of time-varying heterogeneity beyond that modelled by the covariates described above, such as engendered by potentially cumulative effects of LCRs in the pre-treatment period, the DID estimator would be biased. Likewise, to the extent that countries differ with respect to their policy and institutional regimes, and that these differences vary over time or give rise to time-varying heterogeneity, the omission of policy and institutional variables could be an important source of bias.

These limitations should not be overstated. It should be recalled, following the discussion in section 5.3, that even if the conditions required to establish a causal effect are not satisfied, the presence of large and significant coefficients on the post-treatment dummy variables is still substantively interesting if we consider the latter as descriptive estimands. In this sense, they simply represent the difference between the outcomes for the treatment and control groups, conditional on the covariates in the sample. This is particularly important in circumstances in which the sample analysed is large in relation to the population, and when differences in treatment status can be interpreted as a arising from qualitative differences in kind between the groups, such as in the present case. Thus, the DID estimator clearly depicts a substantial

[80] Of course, this threat can easily be overstated, since there are clear logistical advantages to assemblers of maintaining local supply networks even in the absence of trade barriers, especially in the case of parts with high weight to value ratios. Nevertheless, the threat is realistic in the case of lighter parts for which productive locations are predominantly determined by cost advantages rather than proximity to sources of demand.

improvement in performance outcomes over time that pertains to the treatment group relative to the control. This is an important finding, regardless of the cause, as it provides an empirical basis on which to examine the mechanisms through which the elimination of LCRs has indeed caused or contributed to the observed outcomes. This was one of the goals of the next stage of my analysis, the findings and implications of which I turn to next.

7.2.2 Case studies

To recap, there were two overarching research questions pertaining to the case study stage of my analysis, relating to an historical institutionalist examination of the periods in which LCRs were in force, and in which they have been removed following the provisions of the TRIMs Agreement. Although the questions were partially addressed in the summary and conclusions sections of each paired comparison, in this section I broaden the comparison to include assessment of the similarities and differences between as well as within pairs of cases. As I have previously described, the aim of the case studies is to combine within-case comparison – permitting analytical generalisation of causal mechanisms that are common across the diverse group of cases – with cross-case comparison according to the method of difference, the goal of which is to attribute causal relationships between the diverse contexts in which LCRs have been implemented and eliminated on the one hand and performance outcomes on the other. Although the two forms of comparison are inextricably linked, I consider them separately.

7.2.2.1 Assessing the contribution of LCRs to performance outcomes and mechanisms

The research questions and sub-questions pertaining to the periods in which LCRs were in force are as follows:

> RQ 2. To what extent and how have LCRs contributed to performance outcomes through the causal mechanisms of FDI and developments in value chain governance?
>
> RQ 2.1. To what extent and how have LCRs contributed to post-liberalisation performance outcomes through cumulative processes arising in the LCRs period?
>
> RQ 2.2. How have the contributions of LCRs differed according to the contexts in which they were implemented?

My aim is to provide an overview of the within-case similarities between the cases, before turning to a cross-case comparison in order to draw inferences regarding the diversity of observed outcomes.

The analysis of causal mechanisms, through the examination of secondary data sources, suggests that across the case studies, LCRs have had different outcomes depending on the temporal contexts and also the manner in which they were implemented. It is difficult to draw any strong inferences about the presence and nature of cumulative processes arising from the implementation of LCRs due to the confounding factors affecting their outcomes that make intertemporal comparison highly problematic.

Broadly speaking, when they were implemented as part of a package of extremely high levels of protection, such as pertained across all of the cases prior to the 1990s, high levels of local content were achieved but it is clear that LCRs skewed the incentives of both assemblers and suppliers towards serving the domestic market, potentially limiting the attainment of efficient levels of scale and the transfer of the most advanced technology, and dampening competitive pressures; exports were correspondingly low. They have also given rise to persistent rent-seeking, and, sheltered from competitive pressure, investment in modernisation and upgrading remained low. These findings are consistent with arguments that LCRs are generally welfare-reducing and have hampered integration of emerging markets into global networks, typified for example by Moran

(1998). Partial exceptions to this trend are observed in the case of Brazil, where the automotive industry had already grown substantially following several decades of import substitution, and the combination of LCRs with export and trade balancing requirements contributed to the emergence of a number of internationally competitive parts suppliers which became integrated into the production networks of the triad automakers in the 1980s and experienced some success exporting independently to other emerging markets. The same is true – although to a lesser extent – in Thailand, where export incentives were also used in the 1980s.

On the other hand, in the majority of the cases examined here, where LCRs have been employed in conjunction with real and potential market growth and a combination of incentives and protection for the assembly sector in order to encourage investment and upgrading in the parts and component sector, the effects have been more benign. In the absence of a counterfactual, it is difficult to quantify precisely the difference LCRs have made and whether outcomes would have been positive in the absence of market growth, but the evidence presented suggests that multinational automakers would have sourced from their existing supply networks instead of local firms to a greater extent in at least some cases. The evidence suggests that during the 1990s, across the range of cases, assemblers have participated in the development of local parts and components networks in two ways, by transferring technology to and working with independent local firms and by encouraging existing global suppliers to establish subsidiaries. As Sturgeon and Lester (2004: 63) put it, global suppliers "most often establish production facilities in developing countries at the behest of their customers who have set up final assembly plants and are trying to meet local content requirements". Therefore, the protective effects of LCRs have not been confined to local suppliers but also global firms. Because the latter tend to be integrated into existing inter- and intra-firm networks, it appears that improvements in export performance during this period are largely attributable to the more geographically fragmented global operations of these firms.

Turning to the differences between cases, the extent to which parts and components suppliers use the protective rents to engage in capability development, and the willingness (and ability) of lead firms to transfer technology and integrate local firms and subsidiaries in their global networks, are determined by the conjunction of LCRs with market conditions, manufacturing capabilities, and other policies and institutions; in short, if implemented in the context of strong locational advantages, LCRs have been accompanied by large influxes of investment in the upgrading and modernisation of both the assembly and parts and component sectors, as appears to have been the case in Brazil, China, Thailand, and also, to a lesser extent, India. There is also evidence of cooperation between assemblers and suppliers during this period. In China and Thailand, the countries exhibiting the most remarkable performance outcomes in the post-liberalisation environment, exports had already begun to increase substantially, albeit from low bases, in the second half of the 1990s. This was also the case in Brazil between 1995 and 1997, although export performance indicators were already high, and this trend was halted as the country fell into recession. On balance, through the mechanisms of increased FDI into the supply sector, LCRs have given rise to cumulative processes, the effects of which have influenced performance outcomes in the period after LCRs were phased out.

In contrast, in countries where locational advantages are relatively lacking, such as in Argentina compared to Brazil, India compared to China, and Malaysia compared to Thailand, local supply has been more exclusively geared towards achieving mandated levels of local content in order to obtain protective rents of small domestic vehicle markets. Thus, local suppliers have generally failed to make the requisite investments to achieve dynamic learning and scale economies and global suppliers have been more reluctant to establish operations. In the case of Argentina and Malaysia, global suppliers have preferred to locate in their more advantageous neighbours, from which they can serve protected regional markets. In Malaysia especially, local content

requirements in conjunction with policies unfavourable to foreign investors have created highly inefficient supply networks, contributing to circumstances in which protection has been difficult to remove.

Despite the evidence at the level of the causal mechanisms driving parts and components sector outcomes, it is impossible to separate the impacts of LCRs from the conditions of rapid sectoral growth in which they were implemented, and from ongoing processes of liberalisation. It is important to note that during this period, from the early 1990s, the elimination of LCRs within all of the cases examined was imminent, with the possible exception of China, which was still negotiating WTO accession at this stage. Furthermore, each of the countries analysed here were poised for rapid sectoral growth, as a result of rising income levels and generally low rates of vehicle ownership. As a result, the observed influxes of investment, upgrading processes, and value chain restructuring may have been predicated on subsequent liberalisation and market growth. This complicates the assessment of the impacts of LCRs during this period because it introduces 'leads' insofar as performance outcomes precede their causes in a temporal sense; obviously, large multinational firms engaging strategically in large sunk investments in production capacity take a long term view in which future market and non-market developments are taken into consideration.

In fact, that positive outcomes of LCRs were predicated on their subsequent elimination may not negate the fact that LCRs were effective, but rather points to a crucial element in their success, which is consistent with much of the theoretical justification for trade and industrial policy more generally. In sum, it appears the elimination of LCRs in a controlled timescale has enabled countries to continue to encourage supplier development as a 'transitional mechanism' during a period of rapid sectoral development (and structural transformation), ensuring that their trade distorting effects on the sector as a whole have not discouraged considerable levels of investment in the vehicle assembly sector and may indeed have contributed to waves of inward 'follow-sourcing' investment by global suppliers as well as encouraged technological upgrading within local firms.

What is clear is that in some of the case studies examined here, namely Brazil, China, India and Thailand, LCRs have not substantially hindered the integration of implementing countries into global production networks, a concern expressed by Brooks et al. (2003). Indeed, my reading of the evidence is more consistent with the technological capability approach associated with Lall (2004), which suggests that industrial policies such as LCRs are a means to enhance the beneficial aspects of integration into MNCs' supply networks under certain specific conditions. In such a view, LCRs should be phased out once market failures have been overcome and domestic capabilities have been established, in order to prevent rent-seeking. The scheduled elimination of LCRs has enabled governments to resist protectionist and rent-seeking lobbies from significantly delaying liberalisation; it has acted like a "built-in sunset clause", something that Rodrik (2004: 22-23) views as a crucial design principle for effective industrial policy[81]. Furthermore, the evidence on the effects of LCRs during the 1990s is consistent with the recommendations of the proponents of the technological capability approach: that policy should target realistically achievable capability gaps in the context of supply and demand conditions. This framework explains why LCRs were so much more effective in some contexts – namely those in which there was a combination of rapid market growth and openness to FDI – than others.

[81] It should be noted, of course, that the sunset clause argument to which I refer has only pertained in the years directly prior to the TRIMs agreement, once the implications of the latter became apparent. Previously, LCRs were introduced before it was known (and before it could have been reasonably anticipated) that such policies would subsequently be restricted by multilateral rules; indeed, in the absence of such constraints, LCRs that were implemented in the 1960s and '70s became 'permanent fixtures' in the policy landscape, encouraged by the rent-seeking behaviour depicted in chapter 3.

7.2.2.2 Assessing the contribution of the elimination of LCRs to performance outcomes and mechanisms

The research questions pertaining to the period following the elimination of LCRs are as follows:

> RQ 3. To what extent and how has the elimination of LCRs contributed to performance outcomes through the causal mechanisms of FDI and developments in value chain governance?
>
> RQ 3.1. How have the contributions of the elimination of LCRs differed according to the contexts in which elimination occurred?
>
> RQ 3.2. To what extent has the elimination of LCRs precluded the promotion of local parts and components production through alternative policy instruments, and what are the implications for analyse of the elimination of LCRs?

In parallel with the previous section, my aims are twofold: firstly, to engage in generalisation of within-case insights to the greatest extent possible, and secondly, to engage in cross-case analysis of the contextual factors occurring in conjunction with liberalisation across diverse cases, in order to draw inferences regarding the contribution of structural factors to the outcomes of the elimination of LCRs. Separately, I provide a summary of the varied ways in which the cases examined here have continued to promote localisation in the automotive sector, and the ways in which this informs the interpretation of my findings.

Most of the case studies have exhibited significantly improved export performance and higher import propensity in the period following the elimination of LCRs, and have continued to exhibit rates of growth in parts and components output roughly in line with increased vehicle production, consistent with the findings from the panel regression stage. However, in some countries, local content levels have remained approximately constant (China and India), in one they have increased (Thailand), while in others they have declined (Argentina, Brazil and Malaysia). Export performance trends has also been highly uneven. It is important to consider, therefore, explanations of the mechanisms through which reductions in output and widespread dislocation have been avoided, increased export performance levels have emerged, and of the divergent performance levels between countries and regions.

In terms of the causal mechanisms driving these outcomes, the evidence from the case studies suggests that the reorientation of domestic suppliers towards export markets, firm-level upgrading with domestic suppliers and more extensive technology transfer from assemblers to suppliers have been relatively insignificant mechanisms in comparison to the contribution of inward investment, mergers and acquisitions, and follow sourcing strategies pursued by global suppliers. As noted above, these strategies were already underway as part of the value chain restructuring at the time LCRs were still in force. Undoubtedly, the elimination of LCRs, as well as reduced trade and investment barriers more generally, have increased the flexibility of more capable suppliers with respect to their strategic decisions and thus cemented their advantages in relation to smaller locally-based firms (Humphrey, 2003; Sturgeon and Lester, 2004). Thus, although LCRs appear not to have had dramatic effects on output measured at the national level, they have contributed to a significant reduction in output by domestic relative to foreign firms as larger, more technologically-capable and globally-integrated multinational suppliers take advantage of opportunities for more extensive geographical fragmentation of productive activities. Even in the more successful countries such as Thailand as indicated by rising local content and export performance indicators, local firms have generally been relegated to less valuable tiers of the supply chain or have been acquired by global investors Partial exceptions to the tendency of domination by global suppliers are the large protected markets of China and India, in which a higher proportion of domestic firms have managed to retain their positions in domestic markets, and the more successful among them have even become integrated into the global networks of automakers based in the US, Europe and Japan. Yet, in China and India too, the

restructuring of automotive value chains has led to considerable denationalisation. The long term impacts of these developments, in terms of indigenous capability development and the potential for emerging markets to encounter an "upgrading 'glass ceiling'" and become "confined to peripheral roles in the MNE auto manufacturers' global supply chain" (Kumaraswamy et al., 2012) largely remain to be seen. It has not been possible to observe these phenomena directly in the analysis carried out here, pointing to the need for more detailed, firm-level analysis of the mechanisms of upgrading and technology transfer, as discussed below.

Across all cases, it is predominantly global suppliers that are engaging in global integration and are driving improvements in export performance, while local firms continue to be oriented towards domestic markets. Thus, a causal mechanism operating across the cases – the consolidation of the parts and components sector by global suppliers – is observed to explain the findings of the panel regression stage, that there has been a large and significant improvement across countries eliminating LCRs.

At the same time, this mechanism can be invoked to explain divergent performance outcomes, based on the relocation of global suppliers to the most advantageous locations based on the conditions present in the post-liberalisation environment. Export orientation of global suppliers is especially pronounced in countries with large and rapidly growing assembly sectors, the presence of which are accompanied by industrial agglomerations, enabling global suppliers to achieve greater levels of scale and productive efficiency and establish significant export platforms, conditions which are largely present in Brazil, China, India and Thailand. In addition, the products manufactured by the global suppliers tend to be highly import intensive, and especially so where complementary local capabilities to source inputs of the requisite cost and quality are not present, conditions which are present in Argentina and Malaysia.

So, while all of the countries examined here have benefitted from increased foreign investment into their parts and components sectors, the outcomes have been uneven. In ASEAN, for example, which provides the context for the paired comparison most closely conforming to the ideal type method of difference, global suppliers are much more likely to establish productive locations in Thailand than Malaysia; but furthermore, the global suppliers that have established facilities in Malaysia are more oriented towards the domestic market, and import higher proportions of subcomponents from their parent companies. The same is true for Argentinian suppliers, many of which are subsidiaries of firms with regional headquarters in Brazil. These insights are suggestive of the causal mechanisms through which the elimination of LCRs may have contributed to divergence between more- and less-advantageous locations, with relatively large declining and widening gaps between exports and imports in the latter, as local firms and subsidiaries are incorporated as more peripheral players into the strategies of the global suppliers and lead firms.

The elimination of LCRs has clearly contributed to shifts in value chain governance that have contributed to increases in import propensity and enhanced export performance. However, the case studies provide clear evidence that the governments of liberalising countries have continued to influence the strategic decisions of lead firms in important ways. These policy and institutional developments are interesting because they suggest that opportunities presented for employing alternative strategies for promoting local automotive vary considerably both within and across the three paired comparisons examined in the thesis. As such, these developments confound the evaluation of local content requirements and their elimination.

Notwithstanding the progressive liberalisation of tariffs, both for finished vehicles and parts, starting in the 1980s and '90s, all of the countries examined here continue to protect their automotive sectors and promote tariff-jumping investments through substantial trade protection at the national or regional levels. Even though tariffs have tended to be higher for vehicles than for parts, reflecting countries' priorities in promoting vehicle production and exports, such policies naturally influence the development of the parts and components subsector because

there are technical and logistical reasons for assemblers to source some components locally even in the absence of trade protection. In any case, substantial tariffs remain for parts and components too, affording protection to suppliers.

By establishing a larger market through which to obtain economies of scale and engage in regional divisions of labour, regional trade institutions make market-seeking investments into the region as a whole more attractive, leading to waves of investment into the ASEAN and Mercosur regions in anticipation of closer regional integration. Arguably, regional policies are a compromise between liberalisation and protection; that high barriers to extra-regional trade are retained suggests that automotive production within ASEAN and Mercosur would be more vulnerable to wider global liberalisation. In both cases, parts and components production has been explicitly promoted through the establishment of regional content requirements with respect to intra-regional trade.

At the same time as protecting regional production as a whole, intra-regional liberalisation promotes divergence within regions to the extent that location-specific advantages vary between participants in regional integration; Brazil has emerged as the preferred location for parts suppliers within Mercosur, and Thailand (as well as the Philippines) within ASEAN. The examples of ASEAN and Mercosur show that countries have deviated from and delayed intra-regional free trade in the cases of Malaysia and Argentina in order to mitigate against polarisation of performance outcomes within regions. These examples offer some tentative support for the idea that trade protection, when not effectively targeted towards capability development, can give rise to vicious cycles of cumulative causation, in which inefficient producers lobby governments for rent-seeking purposes, making the removal of unsuccessful policies politically challenging. In contrast, where local producers are in a strong position relative to global and regional competitors, such as in the case of Thailand and Brazil, liberalisation will encounter less resistance. The case studies examined here are too limited in scope to examine these mechanisms in any depth, although this would be an interesting avenue to pursue in future.

Beyond trade policies, there are a number of other ways in which governments can intervene in the automotive sector to promote localisation indirectly which have been employed across the cases studied here. These include investment restrictions and performance requirements not related to trade, such as foreign equity restrictions and R&D requirements, and targeted fiscal policies to promote automotive investment generally or within specific market segments. All 6 cases have used various forms of fiscal policy to promote automotive investment. Of the cases examined here, continentally-sized domestic markets and legacies of state-ownership have ensured that the promotion of joint ventures between local and foreign capital has been most extensive in China and India.

Finally, the formal elimination of LCRs has not completely eliminated policies that explicitly benefit domestic producers of parts vis-à-vis importers. In response to competitive threats arising from liberalisation and regional integration, both Argentina and Malaysia have implemented policies – the status of which in relation to the TRIMs Agreement are questionable – attaching fiscal benefits to the domestic production of parts. China has penalised automakers importing knocked down kits for assembly in measures that were subsequently ruled as inconsistent with the TRIMs Agreement; perhaps more importantly, the government has applied informal pressure on assemblers through investment licensing procedures in order to promote the establishment of local supply networks.

In sum, examination of the cases studied here suggests that the elimination of explicit LCRs has not entailed complete liberalisation of measures designed to promote local content. While in general, policies have become more 'market-friendly', perhaps most crucially with respect to the liberalisation of investment restrictions, liberalisation has not proceeded evenly, and policy and institutional regimes have varied significantly across the range of cases examined here.

There are two important implications of the preceding discussion, one substantive and one methodological. The substantive implication relates to a core concern of the policy space debate – the extent to which multilateral rules preclude interventionist strategies – and substantiates the observation of Jomo (2001: 5) that "the trends are more contradictory and nuanced than they are often made out to be, and many opportunities still exist within the interstices of the emerging global environment". While scholarly attention has often focused, perhaps justifiably, on the restrictiveness of WTO rules, this has had the effect of diverting attention away from the opportunities that still exist. Examining the ways in which countries have exploited latitude within multilateral and regional rules to promote localisation within their respective automotive spaces has been a valuable contribution of the historical institutionalist perspective adopted here.

The methodological implication is that in the presence of such cross-case and inter-temporal heterogeneity, drawing inferences about the nature of specific causal effects is much more problematic. This insight applies to both the panel regression and case study stages of my research. Simply put, the greater the number of potential sources of divergent outcomes between cases, the more difficult it is to secure inferences "against any chance or spurious associations" (Abell, 2004, cited in Bennett and Elman, 2006: 458) and the more indeterminate our conclusions. This problem is particularly acute within small-n comparisons, due to the problem of many variables and few cases (Lieberson, 1992), and exacerbated in the presence of conjunctive causation. In sum, performance outcomes have diverged within and between the three regional institutional configurations, in ways that are plausibly explained by the causal mechanisms discussed previously, but causal inference is confounded by a host of country- and region-specific contextual factors. In the context of such complex determinants of industrial performance, it is very difficult to draw clear, generalisable inferences about the effect of eliminating LCRs. These issues are discussed further below, as I consider the methodological research questions, assess the limitations of my findings, and consider ways to overcome them in future research.

7.3 SYNTHESIS OF FINDINGS FROM MIXED METHOD APPROACH AND ASSESSMENT OF METHODOLOGICAL IMPLICATIONS

In this section, I assess the methodological implications of my mixed method approach to analysing the impacts of restrictions on LCRs in the automotive sector, and in doing so address the following methodological research questions:

> RQ 4. To what extent has the mixed method approach adopted here been able to account effectively for the complex determinants of industrial performance outcomes in the context of restrictions on the use of LCRs?
>
> RQ 4.1. What are the relative contributions of case- and variable-oriented approaches in this regard?

In exploring these questions I discuss the limitations of my research in terms of the operationalisation of industrial performance and causal mechanisms in light of data availability, the indeterminacy of cross-case causal inferences, and the extent to which findings can be confidently generalised beyond the empirical contexts in which analysis was conducted. These limitations are then discussed in the context of the possibilities for future research.

The fundamental difficulty tackled in the thesis is separating the impacts of a specific policy change from wider confounding variables. Complexity is heightened by the potential for the interaction or conjunction of multiple causal conditions, such that isolating the precise cause of an outcome, or the outcome of a specific cause, becomes nearly impossible outside the context of experimental research designs. The problems of inference are exacerbated by the pertinence of timing and sequencing of causes in relation to others: by the prevalence of 'path dependent' and

cumulative phenomena in the social world. These problems have not been entirely possible to overcome, and caution should be taken when drawing conclusions about the developmental impact of restricting LCRs and policy space more generally.

The approach to complexity adopted in this thesis has built on the methodological literature reviewed in chapter 4, in which two overarching empirical approaches to causal inference – variable- and case-oriented – were examined. Both approaches appeared pertinent to my overall research problem, and both offer distinct and complementary insights. As described in chapter 4, my thesis has followed a 'nested' research design, in which the effects of the elimination of LCRs were examined across a large population. Such an approach has enabled me to incorporate a large number of observations, in order to secure against important sources of heterogeneity, and has enabled me to quantify the magnitude of the causal effect. However, this stage of the research in isolation would be incomplete without an accompanying causal explanation, since there were many potential mechanisms through which this effect could occur.

Through the detailed within-case comparison of 6 cases, the case study stage has offered a theoretically plausible explanation for the change in performance outcomes for the group as a whole, and divergence between them, through mechanisms of FDI and value chain governance. Thus, the case studies make a substantial contribution to my overall research goals, and have considerably strengthened the panel regression findings. Another way in which the studies have complemented the panel regression stage is by examining the possibility that LCRs have given rise to cumulative effects, something that was not considered in the panel stage. The evidence on causal mechanisms suggests that LCRs have indeed given rise to some cumulative effects although it is difficult to assess their magnitude in relation to wider factors and in relation to effects of the subsequent elimination of LCRs. Nevertheless, the evidence that LCRs have been successful in some instances appends an important note of caution to the finding that restriction of LCRs has on balance resulted in improved outcomes. Another caveat is that alongside improved industrial performance outcomes measured by indicators of production and trade, the case studies have shown that the elimination of LCRs has contributed to substantial denationalisation, the long-term effects of which are unclear. Finally, to the extent that the case studies uncovered substantial complexity with respect to policy and institutional developments during the course of the elimination of LCRs, they suggest that further research into the conditions for successful industrial performance, such as the role of trade and investment restrictions, is required to complement the present analysis.

Similarly, the panel regression findings have strengthened the validity of the case study findings. Based on the case studies alone, it would be impossible to attribute the improvement in performance outcomes to the elimination of LCRs as opposed to other factors. In particular, given the tendency for automotive markets to increase in size – and, furthermore, for growth *rates* to pick up throughout the 2000s across the sample as a whole – it becomes difficult to determine the extent to which production, trade and investment patterns are a response by local and multinational suppliers to the possibilities for more efficient scale production afforded by the expansion of local demand (and local assembly), or to policy change that makes integration into global value chains more attractive. These factors have been further confounded, within the paired comparisons for ASEAN and Mercosur, by the effects of huge economic crises that occurred broadly over the period in which local content regimes were liberalised. These crises have affected investment and trade patterns through impacts on exchange rates. As a result of the analysis conducted in the prior panel regression stage, I could be confident that the

elimination of LCRs has had a significant causal effect controlling for these factors, and thus use the case studies to address different aspects of the research.

7.3.1 Limitations of and possible improvements to the evaluation of the elimination of LCRs

Despite the overall effectiveness of my research strategy, some aspects of my research design were less successful. In the case studies, I pursued two goals: the within-case examination of causal mechanisms linking the implementation and elimination of LCRs with performance outcomes, and cross-case analysis aimed at identifying the conjunctive conditions which, in association with the implementation and elimination of LCRs, have led to divergent outcomes. This has necessitated a compromise to be made between the number of cases examined, and the detail of the examination of causal processes within each case. As such, my examination of each case has involved the use on macro-level and secondary data. Thus, to the extent that value chain governance structures and FDI at the country level are intervening variables between the cause (status of content rules) and effect, I have applied process tracing to macro-phenomena rather than 'microprocesses', which focus on individual decision-making level of analysis (George and Bennett, 2005: 211). As George and Bennett (ibid.) observe, "process tracing provides a strong basis for causal inference only if it can establish an uninterrupted causal path linking putative causes to observed effects, at the appropriate levels of analysis as specified by the theory being tested". In this sense, my analysis is limited by a lack of primary, firm-level data on the crucial causal mechanisms affecting outcomes – decisions relating to investment, trade orientation, technological upgrading and cooperation between firms. Instead, I have had to rely on secondary data sources, and the judgements about the nature and magnitude of the relationship between causes, mechanisms and outcomes therein.

An alternative strategy, which is employed throughout the global value chain literature, would be to collect primary data on firm-level decisions, by interviewing assemblers and suppliers directly about their strategic responses to the elimination of LCRs, and how it has affected their activities in different countries. This evidence could support and substantiate the evidence examined here; following Sturgeon (2001: 10), instead of examining secondary sources to examine 6 cases at the national level, I could have engaged in "the painstaking collection of qualitative field data, which, when used in combination with macro-level statistics on trade and investment, can lead us to a more fine-grained understanding of global-scale economic patterns and trends". Given pragmatic concerns about the feasibility of achieving different research goals, such an approach was not feasible alongside the substantial cross-national research presented here, but the collection of such primary data comprises one of the main avenues for future research I identify in considering the limitations of this thesis.

Another of my research goals which I have struggled to achieve is in trying to isolate the causes of heterogeneous outcomes between more- and less-advantageous locations through cross-case analysis, in order to address RQs 2.2 and 3.1. The logic on which such inferences are based at the cross-case level assumes that each pair of cases differs with respect to one fundamental characteristic: the strength of location-specific advantages. Inferring the presence of conjunctive causes is already difficult within small-n comparisons, as the same factors that affect outcomes in conjunction with others also affect outcomes independently, which increases the number of potential causes and thus the indeterminacy of inferences. In the presence of policy and institutional diversity such as observed in the cases here, which increase the number of potential causal conditions again, such an assumption – that the source of the difference between the pairs of cases was adequately operationalised by 'advantages' – seems a gross oversimplification. The cases compared on the basis of one advantage actually differ in a large number of ways, any one

of which could explain the variation in outcomes independently on in conjunction with others. In practice, it is difficult to disentangle the complex interplay of multiple causes, and I have been unable to say much about specific conjunctive causes, beyond the strength of advantages at a very general level, in this stage of my research. To do so would require cases much more closely approximating ideal comparison according to the method of different, which arguably do not exist in the group of countries that have eliminated LCRs.

Despite my characterisation of each paired comparison as comprising an advantageous and disadvantageous location, which has enabled inferences to be drawn about the conjunction of multiple causes, the cases examined here all had relatively strong advantages in some respects, most crucially that they are all middle-income newly industrialised countries which have exhibited strong – if uneven – rates of growth in car production and ownership. It is also likely to be the case that the countries analysed here are unusually well placed to establish automotive production as a result of their size and / or status as partners in large regional projects. This severely limits the generalisation of within-case insights from the case studies to countries in which such advantages are lacking. In order to overcome this limitation, it would have been useful to examine one of the countries in which advantages are more obviously lacking, such as Pakistan or Vietnam. My decision to carry out comparison of the pairs of cases according to the method of difference has thus reduced the scope of the generalisations that can be drawn from the within-case analysis, since in all of the countries examined here it could be argued that relatively strong advantages have mitigated the potential for negative outcomes to arise.

The problem of generalisability also pertains to the panel regression findings. While performance outcomes may have been significantly improved, on average, across the treatment group, it is questionable whether this finding is generalisable beyond the specific historical conditions in which LCRs were eliminated, in which the sample of countries exhibit specific characteristics that made them well-prepared for liberalisation. In addition, I was unable to account for the potential for heterogeneous treatment effects in the panel regression stage, which would have required interactions between the post-treatment dummy variable and an appropriate indicator of location-specific advantages to be modelled.

In summary, each stage individually has significant weaknesses, but by combining the strengths of quantitative statistical analysis and historical institutionalist case studies, I have been able to make a valid contribution to an important empirical topic. However, the fundamental difficulties of inference in the presence of profound causal complexity have not been possible to entirely overcome. Perhaps the greatest shortcoming relates to my decision to examine the relationship between the elimination of LCRs and industrial performance at the macro-comparative level, which was an essential component of my research question, but has nevertheless led to my forgoing other potentially fruitful lines of enquiry at the firm-level.

7.4 Implications for wider theoretical debates and avenues for future research

Of course, these substantive findings are more interesting to the extent that they connect to wider and more general themes of development. In this final section, I consider the broader implications and lessons from the research conducted in this thesis, and discuss the potential for the pursuit of a research agenda to complement the findings and further examine the important debates. In doing so, I address my final research questions:

RQ 5. To what extent and how does the approach adopted here contribute to wider debates about the distribution of the costs and benefits of industrial policies and policy space restrictions more generally across structurally diverse countries?

RQ 5.1. What are the implications of the thesis, if any, with respect to developing countries' pursuit of interventionist trade and industrial policy, and their participation in multilateral negotiating fora?

The elimination of LCRs can be seen to have had a positive average causal impact on industrial performance outcomes across the population. This effect has arisen through the mechanisms of ongoing shifts in governance structures, as larger, more efficient and more globally integrated firms have cooperated with assemblers to drive the relocation of parts and components production towards the liberalising countries. At the same time, I have demonstrated that LCRs have been implemented with some positive effects in circumstances in which they have not discouraged value chain restructuring or deterred inward FDI. Finally, I have shown that effects have been heterogeneous on structurally diverse countries, although the isolation of the precise nature and extent of this divergence has not been possible.

In chapter 1, I situated my research problem within a wider debate about the role of the state in economic development and the extent to which policy restrictions of the type analysed in this thesis can be viewed as an example of 'kicking away the ladder'. Since the effects of the elimination of LCRs have been, on average, positive, does this mean that further restrictions on trade policy space should be supported, in order to further promote the integration of developing countries into global production networks? Can we conclude that structuralist concerns are misguided, and that developing countries would be best served under more liberal regimes? The short answer to both questions, in my judgement, is not necessarily; the generalisation of the insights of the thesis to other debates surrounding trade policy, or even to other empirical contexts beyond the automotive sector, is not warranted.

Despite the numerous positive outcomes associated with the elimination of LCRs in the countries examined here, the emergence of significantly negative outcomes as previously protected parts and components producers are exposed to greater levels of import competition is likely to have been mitigated by unusually buoyant conditions of demand in the cases examined here, and possibly by their exploitation of flexible phase out periods in which LCRs continued to be used. Crucially, while LCRs were an important policy instrument, their elimination has not equated to comprehensive trade liberalisation, and countries have continued to promote local parts and components production through various alternative means, including the significant levels of tariff protection at the national and regional levels, regional content policies and rules of origin, and policies conditioning the entry and activities of foreign investors. In such circumstances, the extreme polarisation of performance outcomes hypothesised by structuralist theories regarding rapid liberalisation has not occurred in the case of the elimination of LCRs, but it is impossible to conclude that it would not have occurred in the absence of mitigating policies and the specific contextual circumstances.

In this respect, it is worth considering that further restrictions on trade and investment policies that are being considered in multilateral, regional and bilateral fora undoubtedly restrict policy space in a far more comprehensive manner. For example, the ongoing Non-Agricultural Market Access (NAMA) negotiations are considerable less flexible with respect to the use of tariffs (Khor

and Goh, 2006) and would practically eliminate the levels of protection that continue to shape the location of investment in the automotive sectors throughout emerging markets. Perhaps the most important threats to developing countries' policy space come from the proliferation of bilateral investment agreements with developed country members (Shadlen, 2005).

Even if the policies that are being restricted have demonstrably harmful in a number of cases, the present thesis provides support for the argument that the impacts of industrial policies are highly context specific. In this context, following the arguments of Rodrik (2010), it is important to note that experimentation with heterodox policies is an important aspect of the process of identifying the correct solution to overcome highly specific market failures. This does not imply that developing countries should resist all further multilateral liberalisation or return to the 'bad old days' of import substitution, but simply, that further restrictions on trade policy space should be approached with caution. In my view, a pragmatic and flexible approach to trade and industrial policy space appears to be warranted; following Wade (2003: 636), this implies "free trade, protection, subsidies, or some combination, depending on a country's circumstances and level of industrialization".

7.4.1 Avenues for future research

In light of the proliferation of bilateral and regional agreements which are much more comprehensive in terms of the extent of trade and investment policy restrictions between participants, as mentioned above, such agreements form an extremely interesting empirical context in which to further explore the extent to which policy space restrictions lead to polarisation of industrial performance outcomes across structurally diverse economies. If firms have complete freedom to invest and trade anywhere within the geographical boundaries of such agreements, it is far more likely that polarisation will occur as firms seek to exploit the comparative advantages of each location. These conditions comprise a superior empirical context in which to examine the validity of structuralist and neoliberal arguments than the global elimination of LCRs, which, as I have described, was substantially confounded by the continuation of interventionist strategies by liberalising countries. In this regard, there are numerous opportunities for empirical work within the regions examined in my case studies, as they approach the stage of more comprehensive intra-regional liberalisation. In addition, bilateral agreements, for example between the US and individual developing countries, provide abundant opportunities for analysis of trade and investment creation and diversion, which could be compared with countries in which such bilateral agreements do not exist in order to draw inferences about the role of other trade and investment policies in promoting industrial development.

The indicators of industrial performance examined in this thesis were essentially proxies, enabling comparison at the macro level, for more important, fundamental variables operating at the firm-level: the accumulation of technological capabilities, whether through upgrading processes internal to firms or through the absorption of technology through inter-firm linkages, and ultimately, to higher levels of productivity, earnings and income. Unfortunately, processes of dynamic learning and spillovers are extremely difficult to observe empirically at the macro level. However, there are several avenues that I argue would provide more detailed and nuanced indicators of industrial performance, which I would like to incorporate into any future research.

Firstly, while I measured industrial performance outcomes at the level of disaggregation that seemed most appropriate for the analysis, it may have been possible to measure industrial performance at a much more nuanced level, by distinguishing between parts and components with different levels of technological sophistication. This would enable examination of the possibility that developments in value chain governance in which lead firms exploited the relative

technological advantages of different locations were eliciting patterns of specialisation not observed at higher levels of aggregation. For example, when two locations demonstrate similar levels of parts and components output or exports, this may actually mask significant divergence of technological capabilities if one location is producing and exporting low-tech, labour intensive goods such as tyres and the other R&D intensive, dynamic products. Using highly disaggregated trade data now available, it is now feasible to identify trade patterns for specific products. This enables an examination of trade patterns by their implied technological level, such as that attempted by Doner et al. (2006b), who "construct a metric that provides a more differentiated measure of industry capacity" by breaking exports into "into three categories: high, medium and low tech". It must be acknowledged that the metric is somewhat incomplete, and "at best an approximation… based on intuition" regarding the level of sophistication, according to one of the creators (John Ravenhill, personal communication, March 2013). Nevertheless, the feasibility of constructing such a metric based on more objective measures, such as capital or R&D intensity, is an important and interesting avenue for future research.

Another is the project proposed by Sturgeon and Gereffi (2009), who argue that we need better macro-comparative data not just on trade, but on other aspects of value chain activities. As they argue, "there is an urgent need to enrich existing metrics with additional data resources and measures that allow us to investigate GVCs more directly. In our view, changes in the global economy, and especially the rise of GVCs, have created measurement problems that require new information and new methods… we propose one possible approach: the collection of economic data according to a generic and parsimonious list of business functions". Such a metric would enable the analysis of global value chain developments much more directly than I was able here.

Finally, the research agenda I have pursued, assessing the empirical effects of the elimination of LCRs, would be substantially complemented via a program of firm-level qualitative work on firm level decisions, as I discussed in relation to the limitations of my research strategy, above.

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APPENDICES

Appendix 1: Annex to Article 2 of the TRIMs Agreement: Illustrative List

Annex to Article 2 of the TRIMs Agreement: Illustrative List

1. TRIMs that are inconsistent with the obligation of national treatment provided for in paragraph 4 of Article III of GATT 1994 include those which are mandatory or enforceable under domestic law or under administrative rulings, or compliance with which is necessary to obtain an advantage, and which require:

(a) the purchase or use by an enterprise of products of domestic origin or from any domestic source, whether specified in terms of particular products, in terms of volume or value of products, or in terms of a proportion of volume or value of its local production; or

(b) that an enterprise's purchases or use of imported products be limited to an amount related to the volume or value of local products that it exports.

2. TRIMs that are inconsistent with the obligation of general elimination of quantitative restrictions provided for in paragraph 1 of Article XI of GATT 1994 include those which are mandatory or enforceable under domestic law or under administrative rulings, or compliance with which is necessary to obtain an advantage, and which restrict:

(a) the importation by an enterprise of products used in or related to its local production, generally or to an amount related to the volume or value of local production that it exports;

(b) the importation by an enterprise of products used in or related to its local production by restricting its access to foreign exchange to an amount related to the foreign exchange inflows attributable to the enterprise; or

(c) the exportation or sale for export by an enterprise of products, whether specified in terms of particular products, in terms of volume or value of products, or in terms of a proportion of volume or value of its local production.

Source: https://www.wto.org/english/res_e/booksp_e/analytic_index_e/trims_e.htm.

Appendix 2: List of data sources specifying dates for implementation and elimination of LCRs

Country	Data sources specifying dates of implementation and elimination of LCRs
Argentina	TRIMs Notification (G/TRIMS/N/1/ARG/1); Trade Policy Reviews (WT/TPR/S/47 and WT/TPR/S/176); TRIMs extension request (G/C/W/295); and responses to questions submitted by the United States (G/SCM/Q2/ARG/26).
Brazil	Trade Policy Reviews (WT/TPR/S/21 and WT/TPR/S/75) and dispute case documents (DS51, DS52, DS64 and DS81)
Chile	TRIMs Notifications (G/TRIMS/N/1/CHL/1 and G/TRIMS/N/1/CHL/1/Add.1) and Trade Policy Review (WT/TPR/S/124). The latter states that local content TRIMs "expired automatically in December 1998" although Chile requested an extension for TRIMs relating to incentives granted to companies based on intermediate exports, which were eventually eliminated in 2003 (p. 50).
China	See footnote 25.
India	Trade Policy Reviews (WT/TPR/S/33; WT/TPR/S/100) and dispute case documents (DS146 and DS175).
Indonesia	Following dispute procedures, the Indonesian government committed to phase out local content rules by 2000: primary data from Trade Policy Reviews (WT/TPR/S/51 and WT/TPR/S/117) and dispute case documents (DS54, DS55, DS59 and DS64).
Malaysia	Trade Policy Reviews (C/RM/S/38 and WT/TPR/S/31) and extension requests (G/C/W/174 and G/C/W/291/Rev.1)
Mexico	Trade Policy Review (WT/TPR/S/29) and extension requests (G/C/W/171 and G/C/W/293).
Pakistan	Trade Policy Reviews (WT/TPR/S/95 and WT/TPR/S/193) and extension request (G/C/W/294).
Philippines	Despite local content requirements being due to elapse in 2000, the Philippines submitted extension requests (G/L/325; G/L/464; and G/L/502) in the context of economic crisis. The 2005 Trade Policy Review (WT/TPR/S/149) specifies that TRIMs were removed by June 2003.
Romania	Romania's TRIMs comprise investment incentives which were phased out in 1999 according to extension request G/C/W/175; the extension request "concerns only the facilities already given to investors" (p. 2) while extension request G/C/W/290 of 2001 refers only to shipbuilding, not the automotive sector. However, Trade Policy Review WT/TPR/S/60 states that fiscal exemptions and reductions last for several years (annex table AIII: 10); according to WT/TPR/S/155, the provisions were eliminated in 2002, which I take to be the final year in which automotive LCRs were in force.
South Africa	South Africa notified automotive TRIMs in 1995 (G/TRIMS/N/1/ZAF/1) but these were eliminated later the same year; see Barnes et al. (2004).
Taiwan	Accession documents (WT/L/433 and WT/ACC/TPKM/18) and Trade Policy Review WT/TPR/S/165.
Thailand	TRIMs Notification (G/TRIMS/N/1/THA/1) and Trade Policy Reviews (C/RM/G/13; WT/TPR/S/9; and WT/TPR/S/63).
Ukraine	The working party report on Ukraine's accession (WT/ACC/UKR/152) states that LCRs were implemented in 1997 and were eliminated in 2001 (p. 66). Although some TRIMs-inconsistent policies were introduced in 2004 (and eliminated the following year, these do not appear to have had the character of LCRs *per se*.
Vietnam	Accession document (WT/ACC/VNM/48).

Appendix 3: Mean parts and component sector performance outcomes, by grouping variable: mean motor vehicle production per capita

Grouping variable: motor vehicle production per capita	Mean ratio of local content to apparent	Mean output spec. index	Mean export spec. / RCA index	Mean imports as a percentage of GDP	Mean trade balance as a percentage of GDP	Mean ratio of export to total trade
Quartile 1 (countries with mean production of 0 - 1 vehicles per 1000 persons)	0.21	0.08	0.22	0.31	-0.18	0.19
Quartile 2 (countries with mean production of 1.1 - 12 vehicles per 1000 persons)	0.57	0.62	0.50	0.47	-0.20	0.35
Quartile 3 (countries with mean production of 12.1 - 30 vehicles per 1000 persons)	0.50	1.10	1.09	0.87	-0.15	0.42
Quartile 4 (countries with mean production of 30.1 - 85 vehicles per 1000 persons)	0.54	1.57	1.62	1.16	-0.01	0.54
Total (all groups)	0.51	1.06	0.86	0.70	-0.14	0.37

Appendix 4: Mean parts and component sector performance outcomes, by grouping variable: mean automotive output as a percentage of GDP

Grouping variable: automotive output as a percentage of GDP	Mean ratio of local content to apparent consumption	Mean output spec. index	Mean export spec. / RCA index	Mean imports as a percentage of GDP	Mean trade balance as a percentage of GDP	Mean ratio of export to total trade
Quartile 1 (countries with mean automotive output of 0 - 0.142% of GDP)	0.09	0.01	0.05	0.27	-0.24	0.08
Quartile 2 (countries with mean automotive output of 0.143 - 0.519% of GDP)	0.28	0.12	0.14	0.33	-0.21	0.18
Quartile 3 (countries with mean automotive output of 0.524 - 3.07% of GDP)	0.41	0.33	0.34	0.38	-0.15	0.29
Quartile 4 (countries with mean automotive output of 3.1 - 10.78% of GDP)	0.52	1.38	1.21	0.93	-0.11	0.45
Total (all groups)	0.42	0.67	0.45	0.48	-0.17	0.26

Appendix 5: Mean parts and component sector performance outcomes, by grouping variable: CIP index

Grouping variable: CIP index	Mean ratio of local content to apparent consumption	Mean output spec. index	Mean export spec. / RCA index	Mean imports as a percentage of GDP	Mean trade balance as a percentage of GDP	Mean ratio of export to total trade
Quartile 1 (countries with mean CIP index of 0.024 - 0.158)	0.12	0.02	0.05	0.33	-0.29	0.07
Quartile 2 (countries with mean CIP index of 0.159 - 0.247)	0.22	0.10	0.14	0.30	-0.23	0.14
Quartile 3 (countries with mean CIP index of 0.248 - 0.407)	0.45	0.63	0.62	0.53	-0.18	0.32
Quartile 4 (countries with mean CIP index of 0.415 - 0.895)	0.54	1.16	0.89	0.77	-0.05	0.45
Total (all groups)	0.43	0.70	0.42	0.48	-0.19	0.24

Appendix 6: Estimation results: value-added and gross fixed capital formation variables: fixed effects with cluster robust standard errors

	Large automotive producers		Wider sample (all countries for which data are available)	
Dependent variable	**Log value-added**	**Log GFCF**	**Log value-added**	**Log GFCF**
Post-treatment dummy, control group	-0.261***	0.172	0.0741	0.0968
	(0.0915)	(0.256)	(0.231)	(0.190)
Post-treatment dummy, treatment group	-0.0195	-0.271	-0.246	-0.337
	(0.147)	(0.257)	(0.215)	(0.292)
Log vehicle production per capita	0.559***	0.491***		
	(0.105)	(0.163)		
Log automotive output as a proportion of GDP			0.865***	0.586**
			(0.0701)	(0.221)
Interpolated CIP index	7.591***	5.962**	3.181**	6.091*
	(2.686)	(2.827)	(1.422)	(3.296)
Observations	330	276	628	518
Number of countries	32	25	63	54
Mean observations per country	10.31	11.04	9.968	9.593
R-squared	0.56	0.32	0.52	0.13

Appendix 7: Estimation results: local content dependent variables: two-way fixed effects with cluster robust standard errors: additional policy and institutional variables

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log local content**	**Log local content / apparent consumption**	**Log local content**	**Log local content / apparent consumption**
Post-treatment dummy, control group	0.00354	-0.122	0.286	0.0621
	(0.130)	(0.0896)	(0.186)	(0.0823)
Post-treatment dummy, treatment group	-0.385	-0.111	-0.446***	-0.249**
	(0.258)	(0.189)	(0.130)	(0.102)
Log vehicle production per capita	1.067***	0.329**		
	(0.235)	(0.144)		
Log automotive output as a proportion of GDP			1.241***	0.735***
			(0.131)	(0.192)
Interpolated CIP index	6.331**	3.676	2.448	-0.0180
	(2.929)	(2.275)	(2.062)	(1.530)
Log parts and components tariffs	0.219	0.303	0.0313	0.364*
	(0.257)	(0.223)	(0.212)	(0.195)
Time trend for countries with regional integration	0.0482	0.0454	-0.000260	-0.0100
	(0.0448)	(0.0374)	(0.0254)	(0.0217)
Observations	246	246	407	407
Number of countries	26	26	52	52
Mean observations per country	9.46	9.46	7.83	7.83
R-squared	0.65	0.22	0.65	0.34

Appendix 8: Estimation results: local content dependent variables: two-way fixed effects with cluster robust standard errors: region-specific year effects (coefficients not reported)

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log local content**	**Log local content / apparent consumption**	**Log local content**	**Log local content / apparent consumption**
Post-treatment dummy, control group	-0.0762	-0.154	0.228	0.0998
	(0.206)	(0.140)	(0.224)	(0.122)
Post-treatment dummy, treatment group	-0.528*	-0.315	-0.475**	-0.415***
	(0.294)	(0.195)	(0.190)	(0.148)
Log vehicle production per capita	1.068***	0.376**		
	(0.253)	(0.175)		
Log automotive output as a proportion of GDP			1.286***	0.837***
			(0.130)	(0.216)
Interpolated CIP index	4.891*	2.149	3.513*	1.150
	(2.632)	(1.963)	(2.039)	(1.691)
Observations	257	257	431	431
Number of countries	26	26	52	52
Mean observations per country	9.46	9.46	7.83	7.83
R-squared	0.76	0.52	0.72	0.45

Appendix 9: Estimation results: output dependent variables: two-way fixed effects with cluster robust standard errors: additional policy and institutional variables

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log output**	**Log output specialisation index**	**Log output**	**Log output specialisation index**
Post-treatment dummy, control group	-0.148*	-0.255*	0.0815	0.000276
	(0.0774)	(0.131)	(0.140)	(0.0823)
Post-treatment dummy, treatment group	0.0113	0.0891	-0.110	-0.0514
	(0.171)	(0.183)	(0.165)	(0.123)
Log vehicle production per capita	0.639***	0.413***		
	(0.140)	(0.124)		
Log automotive output as a proportion of GDP			0.800***	0.755***
			(0.131)	(0.120)
Interpolated CIP index	8.053***	6.555***	2.691	1.558
	(2.186)	(1.733)	(1.967)	(1.563)
Log parts and components tariffs	0.0921	0.129	0.636**	0.577**
	(0.223)	(0.187)	(0.309)	(0.243)
Time trend for countries with regional integration	0.0644	0.0553	0.000603	0.00670
	(0.0446)	(0.0366)	(0.0231)	(0.0202)
Observations	323	323	613	613
Number of countries	30	30	62	62
Mean observations per country	10.77	10.77	9.887	9.887
R-squared	0.68	0.58	0.61	0.58

Appendix 10: Estimation results: output dependent variables: two-way fixed effects with cluster robust standard errors: region-specific year effects (coefficients not reported)

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log output**	**Log output specialisation index**	**Log output**	**Log output specialisation index**
Post-treatment dummy, control group	-0.298*	0.0136	0.0243	0.0621
	(0.157)	(0.162)	(0.205)	(0.135)
Post-treatment dummy, treatment group	-0.0445	-0.286**	-0.217	-0.255
	(0.189)	(0.129)	(0.185)	(0.175)
Log vehicle production per capita	0.574***	0.402***		
	(0.118)	(0.0959)		
Log automotive output as a proportion of GDP			0.703***	0.672***
			(0.140)	(0.131)
Interpolated CIP index	6.331***	4.339***	1.122	-0.385
	(1.873)	(1.474)	(1.568)	(1.385)
Observations	334	334	662	662
Number of countries	31	31	64	64
Mean observations per country	10.77	10.77	10.34	10.34
R-squared	0.88	0.84	0.57	0.51

Appendix 11: Estimation results: export dependent variables: two-way fixed effects with cluster robust standard errors: additional policy and institutional variables

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log exports**	**Log export specialisation (RCA) index**	**Log exports**	**Log export specialisation (RCA) index**
Post-treatment dummy, control group	-0.107	-0.163*	-0.284	-0.243
	(0.102)	(0.0873)	(0.196)	(0.187)
Post-treatment dummy, treatment group	0.341**	0.448***	0.619***	0.486**
	(0.147)	(0.126)	(0.210)	(0.190)
Log vehicle production per capita	0.392***	0.178***		
	(0.0749)	(0.0523)		
Log automotive output as a proportion of GDP			0.0388	-0.0421
			(0.122)	(0.122)
Interpolated CIP index	7.103***	5.854***	6.911**	6.303*
	(1.113)	(1.085)	(3.456)	(3.218)
Log parts and components tariffs	-0.248*	-0.0617	-0.0938	-0.0537
	(0.128)	(0.0887)	(0.157)	(0.109)
Time trend for countries with regional integration	0.001	0.0318**	0.000	0.013
	-0.015	-0.013	-0.029	-0.028
Observations	465	465	892	888
Number of countries	31	31	85	85
Mean observations per country	15	15	10.49	10.45
R-squared	0.81	0.56	0.36	0.15

Appendix 12: Estimation results: export dependent variables: two-way fixed effects with cluster robust standard errors: region-specific year effects (coefficients not reported)

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log exports**	**Log export specialisation (RCA) index**	**Log exports**	**Log export specialisation (RCA) index**
Post-treatment dummy, control group	-0.612***	-0.437***	-0.265	-0.104
	(0.157)	(0.132)	(0.190)	(0.177)
Post-treatment dummy, treatment group	0.783***	0.720***	0.571***	0.358*
	(0.123)	(0.127)	(0.200)	(0.184)
Log vehicle production per capita	0.365***	0.134**		
	(0.0775)	(0.0585)		
Log automotive output as a proportion of GDP			0.0437	-0.0185
			(0.106)	(0.103)
Interpolated CIP index	6.717***	4.110**	6.047*	5.230*
	(1.227)	(1.547)	(3.177)	(2.730)
Observations	480	480	973	969
Number of countries	32	32	90	90
Mean observations per country	15	15	10.81	10.77
R-squared	0.90	0.78	0.43	0.24

Appendix 13: Estimation results: import dependent variables: two-way fixed effects with cluster robust standard errors: additional policy and institutional variables

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log imports**	**Log imports as a proportion of GDP**	**Log imports**	**Log imports as a proportion of GDP**
Post-treatment dummy, control group	0.0990	0.0495	-0.179	-0.215**
	(0.122)	(0.101)	(0.111)	(0.0994)
Post-treatment dummy, treatment group	0.101	0.187	0.456**	0.417***
	(0.171)	(0.156)	(0.186)	(0.155)
Log vehicle production per capita	0.539***	0.318***		
	(0.0873)	(0.0596)		
Log automotive output as a proportion of GDP			0.0797	0.0679
			(0.0671)	(0.0642)
Interpolated CIP index	1.442	0.194	2.932*	1.530
	(1.179)	(1.085)	(1.494)	(1.350)
Log parts and components tariffs	-0.107	-0.0500	0.0223	0.0115
	(0.146)	(0.0972)	(0.0902)	(0.0640)
Time trend for countries with regional integration	-0.0199	-0.0119	0.00390	0.0113
	(0.0132)	(0.0151)	(0.0134)	(0.0119)
Observations	465	465	896	896
Number of countries	31	31	86	86
Mean observations per country	15	15	10.42	10.42
R-squared	0.83	0.50	0.41	0.12

Appendix 14: Estimation results: import dependent variables: two-way fixed effects with cluster robust standard errors: region-specific year effects (coefficients not reported)

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Log imports**	**Log imports as a proportion of GDP**	**Log imports**	**Log imports as a proportion of GDP**
Post-treatment dummy, control group	-0.210	0.157	-0.368***	-0.282**
	(0.253)	(0.253)	(0.137)	(0.124)
Post-treatment dummy, treatment group	0.471*	0.248	0.593***	0.443**
	(0.264)	(0.285)	(0.204)	(0.173)
Log vehicle production per capita	0.468***	0.298***		
	(0.0636)	(0.0460)		
Log automotive output as a proportion of GDP			0.0230	0.0238
			(0.0709)	(0.0654)
Interpolated CIP index	1.408	-0.126	2.646*	0.950
	(1.140)	(1.465)	(1.523)	(1.399)
Observations	480	480	977	977
Number of countries	32	32	91	91
Mean observations per country	15	15	10.74	10.74
R-squared	0.88	0.57	0.50	0.21

Appendix 15: Estimation results: trade balance and export ratio dependent variables: two-way fixed effects with cluster robust standard errors: additional policy and institutional variables

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Trade balance as a percentage of GDP**	**Exports as a proportion of trade**	**Trade balance as a percentage of GDP**	**Exports as a proportion of trade**
Post-treatment dummy, control group	0.00515	-0.0403	0.0360	-0.0272
	(0.0673)	(0.0364)	(0.0591)	(0.0355)
Post-treatment dummy, treatment group	-0.0880	0.0503*	-0.0817	0.0421
	(0.117)	(0.0275)	(0.0941)	(0.0255)
Log vehicle production per capita	-0.131*	-0.0352**		
	(0.0769)	(0.0165)		
Log automotive output as a proportion of GDP			-0.00345	0.000373
			(0.0246)	(0.0133)
Interpolated CIP index	5.409***	1.274***	1.949*	0.582
	(0.931)	(0.205)	(1.008)	(0.421)
Log parts and components tariffs	-0.0982	-0.0307	-0.0552*	-0.0119
	(0.0645)	(0.0201)	(0.0287)	(0.0151)
Time trend for countries with regional integration	0.0174**	0.00490	0.0113	0.00278
	(0.00801)	(0.00310)	(0.00822)	(0.00365)
Observations	465	465	892	892
Number of countries	31	31	85	85
Mean observations per country	15	15	10.49	10.49
R-squared	0.45	0.36	0.17	0.10

Appendix 16: Estimation results: trade balance and export ratio dependent variables: two-way fixed effects with cluster robust standard errors: region-specific year effects (coefficients not reported)

	Large automotive producers		Wider sample (all countries for which data are available)	
Model	**(1)**	**(2)**	**(3)**	**(4)**
Dependent variable	**Trade balance as a percentage of GDP**	**Exports as a proportion of trade**	**Trade balance as a percentage of GDP**	**Exports as a proportion of trade**
Post-treatment dummy, control group	0.0690	-0.0811**	0.0274	-0.00952
	(0.138)	(0.0354)	(0.0584)	(0.0349)
Post-treatment dummy, treatment group	-0.161	0.0586*	-0.0760	0.0208
	(0.111)	(0.0335)	(0.0951)	(0.0279)
Log vehicle production per capita	-0.0910	-0.0215		
	(0.0886)	(0.0174)		
Log automotive output as a proportion of GDP			0.0160	0.0106
			(0.0236)	(0.0110)
Interpolated CIP index	6.474***	1.141***	1.977**	0.499
	(1.204)	(0.243)	(0.933)	(0.378)
Observations	480	480	973	973
Number of countries	32	32	90	90
Mean observations per country	15	15	10.81	10.81
R-squared	0.50	0.45	0.22	0.20

Appendix 17: Comparison of country-specific structural characteristics within and across regional institutional configurations

	Pop., millions, 2000	GDP, billions of USD, 2000	GDP per capita, USD, 2000	Mean CIP index, 1997 and 2003	Vehicle stock, million units, 2007	Mean vehicle stock per 1000 persons, 2003-2009	Mean annual % growth in vehicle sales, 2005-2013	Mean vehicle tariffs, 1995-2011
ASEAN								
Indonesia	213	165	773	0.26	16.3	60	15.5	32.8
Malaysia	23	94	4006	0.48	8.6	305	2.5	32.3
Philippines	77	81	1048	0.39	2.8	33	10.7	16.1
Thailand	63	123	1943	0.40	9.0	140	11.9	39.1
Vietnam	78	31	402	0.15	1.1	13	18.0	38.3
EU								
Romania	22	37	1651	0.31	4.2	194	-10.6	17.0
Mercosur								
Argentina	37	284	7696	0.26	12.4	314	13.2	24.3
Brazil	174	645	3696	0.30	37.4	184	10.6	31.2
NAFTA								
Mexico	100	581	5817	0.41	26.9	233	0.0	23.4
No significant regionalisation								
Chile	15	79	5145	0.21	2.7	154	11.6	7.6
China	1263	1198	949	0.40	42.2	29	19.0	29.7
India	1054	475	450	0.28	17.4	15	11.4	42.0
Pakistan	145	74	512	0.23	2.0	12	-0.3	62.2
South Africa	44	133	3020	0.27	7.6	151	2.2	14.6
Taiwan	N/A	N/A	N/A	0.54	N/A	N/A	-4.3	24.9
Ukraine	49	31	636	N/A	7.0	148	6.6	11.3

Source: author's calculations based on data from World Bank (2011), UNIDO (2011), and WITS (2015). Notes: data on vehicle stock pertain to the years 2003-2009, but are not comprehensively available for all cross sectional units and years; calculations of mean values may reflect missing data. Total vehicle stock is calculated using 2006 data for India and Thailand due to missing values for 2007.

Appendix 18: Comparison of country-specific performance outcomes within and across regional institutional configurations

	Local content ratio		Output specialisation index		Export specialisation index		Trade balance as a proportion of GDP		Ratio of exports to trade	
	$\bar{Y}^{Per2}$	$(\bar{Y}^{Per2} - \bar{Y}^{Per1})$	$\bar{Y}^{Per2}$	$(\bar{Y}^{Per2} - \bar{Y}^{Per1})$	$\bar{Y}^{Per2}$	$(\bar{Y}^{Per2} - \bar{Y}^{Per1})$	$\bar{Y}^{Per2}$	$(\bar{Y}^{Per2} - \bar{Y}^{Per1})$	$\bar{Y}^{Per2}$	$(\bar{Y}^{Per2} - \bar{Y}^{Per1})$
ASEAN										
Indonesia	0.44	0.09	0.39	0.05	0.34	0.23	-0.19	0.25	0.34	0.18
Malaysia	0.52	-0.12	0.72	0.07	0.14	0.09	-0.33	-0.13	0.31	0.03
Philippines	-	-	0.60	-	1.56	0.95	0.77	0.58	0.79	0.19
Thailand	0.67	0.12	3.07	1.42	0.87	0.66	-0.40	0.48	0.42	0.21
Vietnam	-	-	-	-	0.22	0.21	-0.33	-0.27	0.32	0.20
EU										
Romania	0.43	-	0.89	-	1.87	1.44	0.31	0.34	0.58	0.09
Mercosur										
Argentina	0.53	-0.08	0.94	0.42	0.88	0.03	-0.36	-0.11	0.35	0.06
Brazil	0.72	-0.01	1.30	0.42	1.15	-0.21	0.03	0.04	0.52	0.03
NAFTA										
Mexico	-	-	0.65	0.09	2.07	0.59	-0.16	0.47	0.47	0.09
No significant regionalisation										
Chile	0.07	-0.07	0.03	-0.04	0.12	0.00	-0.31	-0.16	0.18	-0.05
China	0.85	0.03	1.45	0.82	0.42	0.27	-0.04	0.03	0.46	0.13
India	0.89	0.01	0.72	0.18	0.44	0.10	-0.05	-0.02	0.42	0.00
Pakistan	0.52	-	0.19	-	0.04	0.03	-0.12	-0.05	0.08	0.03
South Africa					0.57	-0.10	-0.07	-0.11	0.44	-0.09
Taiwan	0.71	-	-	-	-	-	-	-	0.68	0.11
Ukraine	0.11	-	0.16	-	0.14	-0.07	-0.86	-0.74	0.13	-0.25

Sources as for panel data analysis. Note: $\bar{Y}^{Per2}$ represents mean outcomes for 2002-2011, except for output specialisation index indicator, for which it represents mean outcomes for 2002-2006, due to the availability of data on which to calculate the specialisation index. $(\bar{Y}^{Per2} - \bar{Y}^{Per1})$ represents the difference or change in mean outcomes for $\bar{Y}^{Per2}$ with respect to mean outcomes for 1995-2001.

Appendix 19: Indicators of parts and components (SITC 784) trade performance: Malaysia, 1995-2010

	Exports, millions of constant 1995 USD	% annual growth, exports	Imports, millions of constant 1995 USD	% annual growth, imports	Exports as a % of world export	RCA index	Exports / total trade	Trade balance, millions of constant 1995 USD	Trade balance as a % of GDP
1995	78.4		301		0.07	0.05	0.21	-223	-0.25
1996	74.6	-5	370	23	0.06	0.04	0.17	-295	-0.30
1997	76.6	3	390	5	0.07	0.05	0.16	-313	-0.33
1998	71.1	-7	111	-72	0.06	0.04	0.39	-40	-0.06
1999	102	43	188	69	0.08	0.05	0.35	-86	-0.12
2000	123	21	274	46	0.1	0.06	0.31	-151	-0.18
2001	115	-7	246	-10	0.1	0.07	0.32	-131	-0.16
2002	129	12	300	22	0.1	0.07	0.30	-171	-0.20
2003	193	50	442	47	0.12	0.09	0.30	-249	-0.26
2004	228	18	518	17	0.13	0.1	0.31	-290	-0.29
2005	297	30	833	61	0.16	0.12	0.26	-536	-0.48
2006	330	11	795	-5	0.17	0.13	0.29	-465	-0.38
2007	414	25	871	10	0.19	0.15	0.32	-457	-0.32
2008	428	3	942	8	0.2	0.16	0.31	-514	-0.31
2009	400	-7	894	-5	0.25	0.19	0.31	-494	-0.34
2010	559	40	1200	34	0.27	0.2	0.32	-641	-0.37

Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Appendix 20: Indicators of parts and components (SITC 784) trade performance: Thailand, 1995-2010

	Exports, millions of constant 1995 USD	% annual growth, exports	Imports, millions of constant 1995 USD	% annual growth, imports	Exports as a % of world export	RCA index	Exports / total trade	Trade balance, millions of constant 1995 USD	Trade balance as a % of GDP
1995	140		3020		0.12	0.11	0.04	-2880	-1.72
1996	121	-14	2970	-2	0.1	0.1	0.04	-2849	-1.61
1997	156	29	1340	-55	0.13	0.13	0.10	-1184	-0.83
1998	219	40	272	-80	0.18	0.18	0.45	-53	-0.05
1999	314	43	663	144	0.26	0.25	0.32	-349	-0.31
2000	450	43	1280	93	0.36	0.33	0.26	-830	-0.76
2001	431	-4	1320	3	0.36	0.34	0.25	-889	-0.90
2002	537	25	1520	15	0.42	0.39	0.26	-983	-0.92
2003	857	60	2130	40	0.55	0.5	0.29	-1273	-1.01
2004	1150	34	2290	8	0.67	0.63	0.33	-1140	-0.88
2005	1660	44	2360	3	0.91	0.85	0.41	-700	-0.50
2006	1900	14	2150	-9	0.97	0.89	0.47	-250	-0.16
2007	2510	32	2270	6	1.16	1.04	0.53	240	0.13
2008	2910	16	2630	16	1.34	1.19	0.53	280	0.14
2009	2140	-26	2210	-16	1.33	1.08	0.49	-70	-0.04
2010	2920	36	3830	73	1.4	1.07	0.43	-910	-0.41

Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Appendix 21: Indicators of parts and components (SITC 784) trade performance: Argentina, 1995-2010

	Exports, millions of constant 1995 USD	% annual growth, exports	Imports, millions of constant 1995 USD	% annual growth, imports	Exports as % of output (ISIC 343)	Exports as a % of world exports	RCA index	Exports / total trade	Trade balance, millions of constant 1995 USD	Trade balance as a % of GDP
1995	546		868		21	0.48	1.17	0.39	-322	-0.12
1996	428	-22	1030	19	16	0.37	0.83	0.29	-602	-0.23
1997	405	-5	1540	50	14	0.34	0.71	0.21	-1135	-0.41
1998	427	5	1580	3	14	0.36	0.73	0.21	-1153	-0.41
1999	454	6	975	-38	21	0.37	0.89	0.32	-521	-0.20
2000	463	2	1030	6	23	0.37	0.88	0.31	-567	-0.22
2001	367	-21	689	-33	24	0.31	0.71	0.35	-322	-0.14
2002	365	-1	376	-45	30	0.28	0.7	0.49	-11	-0.01
2003	440	21	506	35	33	0.28	0.7	0.47	-66	-0.06
2004	550	25	796	57	31	0.32	0.84	0.41	-246	-0.20
2005	643	17	1030	29	30	0.35	0.9	0.38	-387	-0.27
2006	730	14	1370	33	31	0.37	0.96	0.35	-640	-0.40
2007	856	17	1750	28	32	0.4	0.98	0.33	-894	-0.47
2008	910	6	2160	23	29	0.42	0.95	0.30	-1250	-0.54
2009	667	-27	1560	-28	27	0.41	0.92	0.30	-893	-0.41
2010	909	36	2480	59	30	0.44	0.96	0.27	-1571	-0.61

Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Appendix 22: Indicators of parts and components (SITC 784) trade performance: Brazil, 1995-2010

	Exports, millions of constant 1995 USD	% annual growth, exports	Imports, millions of constant 1995 USD	% annual growth, imports	Exports as % of output (ISIC 343)	Exports as a % of world exports	RCA index	Exports / total trade	Trade balance, millions of constant 1995 USD	Trade balance as a % of GDP
1995	1470		1490		11	1.3	1.42	0.50	-20	0.00
1996	1520	3	1770	19	12	1.32	1.46	0.46	-250	-0.03
1997	1690	11	1670	-6	14	1.44	1.48	0.50	20	0.00
1998	1670	-1	1570	-6	17	1.41	1.48	0.52	100	0.01
1999	1320	-21	1450	-8	20	1.08	1.26	0.48	-130	-0.02
2000	1390	5	1460	1	17	1.11	1.27	0.49	-70	-0.01
2001	1370	-1	1360	-7	21	1.16	1.2	0.50	10	0.00
2002	1300	-5	1160	-15	21	1.01	1.06	0.53	140	0.03
2003	1730	33	1330	15	23	1.1	1.12	0.57	400	0.08
2004	2090	21	1660	25	20	1.22	1.14	0.56	430	0.08
2005	2650	27	1990	20	18	1.46	1.27	0.57	660	0.10
2006	3020	14	1900	-5	18	1.55	1.34	0.61	1120	0.14
2007	2870	-5	2480	31	15	1.33	1.14	0.54	390	0.04
2008	3420	19	3550	43	17	1.57	1.26	0.49	-130	-0.01
2009	2220	-35	2620	-26	11	1.38	1.11	0.46	-400	-0.03
2010	3030	36	3510	34	12	1.45	1.08	0.46	-480	-0.03

Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Appendix 23: Indicators of parts and components (SITC 784) trade performance: China, 1995-2010

	Exports, millions of constant 1995 USD	% annual growth, exports	Imports, millions of constant 1995 USD	% annual growth, imports	Exports as % of output (ISIC 343)	Exports as a % of world exports	RCA index	Exports / total trade	Trade balance, millions of constant 1995 USD	Trade balance as a % of GDP
1995	378		897			0.34	0.11	0.30	-519	-0.07
1996	372	-2	1070	19		0.32	0.11	0.26	-698	-0.08
1997	426	15	906	-15	6	0.36	0.11	0.32	-480	-0.05
1998	498	17	886	-2	6	0.42	0.12	0.36	-388	-0.04
1999	716	44	1160	31	8	0.58	0.17	0.38	-444	-0.05
2000	1000	40	1880	62	11	0.79	0.2	0.35	-880	-0.08
2001	1170	17	2190	16	10	0.99	0.23	0.35	-1020	-0.09
2002	1570	34	2550	16		1.22	0.24	0.38	-980	-0.08
2003	2160	38	5550	118	8	1.37	0.23	0.28	-3390	-0.23
2004	3570	65	5920	7	10	2.09	0.32	0.38	-2350	-0.15
2005	5170	45	5260	-11	13	2.85	0.38	0.50	-90	0.00
2006	6750	31	6840	30	13	3.46	0.43	0.50	-90	0.00
2007	9100	35	7850	15	12	4.2	0.47	0.54	1250	0.05
2008	10600	16	7880	0	11	4.87	0.54	0.57	2720	0.09
2009	8310	-22	8850	12	7	5.16	0.53	0.48	-540	-0.02
2010	11800	42	12600	42		5.64	0.54	0.48	-800	-0.02

Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Appendix 24: Indicators of parts and components (SITC 784) trade performance: India, 1995-2010

	Exports, millions of constant 1995 USD	% annual growth, exports	Imports, millions of constant 1995 USD	% annual growth, imports	Exports as % of output (ISIC 343)	Exports as a % of world exports	RCA index	Exports / total trade	Trade balance, millions of constant 1995 USD	Trade balance as a % of GDP
1995	277		346			0.25	0.4	0.44	-69	-0.02
1996	270	-3	424	23		0.23	0.37	0.39	-154	-0.04
1997	239	-11	313	-26	11	0.2	0.32	0.43	-74	-0.02
1998	207	-13	286	-9	8	0.17	0.28	0.42	-79	-0.02
1999	231	12	391	37	7	0.19	0.3	0.37	-160	-0.04
2000	276	19	452	16	9	0.22	0.33	0.38	-176	-0.04
2001	311	13	350	-23	10	0.26	0.37	0.47	-39	-0.01
2002	337	8	391	12	9	0.26	0.34	0.46	-54	-0.01
2003	433	28	560	43	9	0.28	0.35	0.44	-127	-0.02
2004	573	32	830	48	9	0.33	0.39	0.41	-257	-0.04
2005	896	56	1030	24	13	0.49	0.51	0.47	-134	-0.02
2006	1040	16	1080	5	11	0.53	0.52	0.49	-40	-0.01
2007	1100	6	1360	26	10	0.51	0.47	0.45	-260	-0.03
2008	1250	14	2130	57	10	0.57	0.47	0.37	-880	-0.10
2009	894	-28	1760	-17	6	0.56	0.42	0.34	-866	-0.09
2010	1460	63	2510	43		0.7	0.46	0.37	-1050	-0.09

Source: author's calculations based on WITS (2015) and World Bank (2011) data.

Appendix 25: Key policy developments pertaining to the automotive sector: Malaysia and Thailand, 1980s-2010

Year	Malaysian policy reforms	Thai policy reforms	Regional developments affecting both countries
1980s	High tariffs on finished vehicles (140-300%) with preferential rates for 'knocked down' kits. Local content in assembled vehicles enforced through Mandatory Deletion Programme (1980). National Car Project (implemented 1983, Proton Saga launched 1985) incorporating generous fiscal incentives (Pioneer status and Investment Tax Allowance, 1986). Complementary Vendor Development Programme sought to enable cooperation between Proton and SME parts suppliers.	High tariffs and import licensing restrictions on finished vehicles (180-300%) with preferential rates for 'knocked down' kits. Progressively increasing levels of local content required for assembly (until 1994). Tariff rebates for exporters implemented 1983.	Brand to Brand Complementation (BBC) Scheme implemented 1987.
1989		Abolishment of restrictions on production levels.	
1990		Tariff reductions (especially large for 'knocked-down' kits). Replacement of quotas and bans with tariffs. Approval of new assembly plants.	
1991			
1992			
1993			
1994	Second National Car project (Perodua) implemented 1993. Third National Car Project (MTB) implemented 1994. Progressive increase in required local content levels.	Expansion of export incentives to include exemption of all domestic taxes.	
1995			Establishment of WTO, stipulating five-year phase period for prohibited TRIMs.
1996			Implementation of ASEAN Industrial Cooperation (AICO) Scheme.
1997	Increase in tariffs on finished vehicles.	Abolishment of foreign equity limits on investments (announced 1993). Increase in tariffs on finished vehicles.	Onset of Asian crisis.
1998			
1999			
2000		Elimination of local content requirements and removal of automotive products from AFTA exclusion list.	
2001			
2002			
2003			ASEAN Free Trade Area (AFTA) comes into force for intra-regional automotive trade (implementation delayed in Malaysia).
2004	Elimination of local content requirements and fiscal preferences for national firms.		

Year	Malaysian policy reforms	Thai policy reforms	Regional developments affecting both countries
2005	Removal of automotive products from AFTA exclusion list, but level not reduced to CEPT level. Tariff reductions compensated by increases in excise duties.		Australia-ASEAN bilateral trade agreement.
2006	Implementation of National Automotive Policy, including informal / discretionary fiscal policy favouring (national) firms with high local content ratios, and capital investment subsidies.		
2007			
2008	Malaysia implements AFTA in full, applying CEPT. Tariff reductions compensated by increases in excise duties.		
2009			
2010			ASEAN-India FTA

Source: compiled by the author.

Appendix 26: Key policy developments pertaining to the automotive sector: Argentina and Brazil, 1980s-2010

Year(s)	Argentinean national policy reforms	Brazilian national policy reforms	Regional and multilateral policy reforms
1980s	Prohibitively high trade and investment restrictions	Prohibitively high trade and investment restrictions	No significant regional or multilateral developments
1990			
1991	Implementation of Argentinean Automotive Regime (Decree No. 2677/91), including local content and trade balancing requirements.		
1992		Implementation of tariff reductions and tax incentives for production of 'popular car'.	
1993			
1994			
1995		Implementation of the Brazilian Automotive Regime: large tariff increases and quantitative restrictions (quotas) on finished vehicles.	Oura Preto Protocol establishing Mercosur common market; Uruguay Agreement establishing World Trade Organisation.
1996	Modification of the Argentinean Automotive Regime, with further incentives for local content and export-oriented production.	Implementation of local content and trade-balancing requirements attached to fiscal incentives. Dispute cases DS51, DS52, DS64 and DS81 brought to the WTO.	'Towards integration': reduction of tariffs for intra-regional trade; trade-balancing clauses retained.
1997			
1998	Loss of competitiveness due to Brazilian devaluation	Brazilian crisis; devaluation of *Real* in 1999	
1999			
2000	Argentinean crisis; devaluation of the *Peso* in late 2002	Withdrawal of prohibited TRIMs including local content requirements	'Deepening integration': implementation of common external tariff and regional content rules; elimination of national incentive programmes. Establishment of preferential trade agreements with Chile and Mexico.
2001			
2002			
2003			
2004	Withdrawal of prohibited TRIMs		
2005	Implementation of Incentive Regime (Decree No. 774/2005) granting (discretionary) cash refunds for purchases of locally produced parts and components		'Reversing integration': re-imposition of stricter trade balancing requirements
2006			
2007			
2008			
2009-		Implementation of the INOVAR-AUTO programme, increasing tariffs and providing fiscal incentives for domestic production.	Trade disputes with Mexico and within Mercosur. Protective policies reinstated.

Source: collation of secondary data by the author.

Appendix 27: Key policy developments pertaining to the automotive sector: China and India, 1980s-2010

Year	Chinese automotive market developments and policy reforms	Indian automotive market developments and policy reforms
1980s	Highly restricted trade and investment	Highly restricted trade and investment
1990		
1991		Rapid investment liberalisation: licensing of new entrants, openness to FDI (with equity limits), and liberalisation of tariff and non-tariff barriers.
1992		
1993		Imposition of ad hoc (discretionary) automotive investment criteria, including local content requirements.
1994	Implementation of the Automotive Industrial Policy: gradual liberalisation of trade and investment. Stringent local content requirements implemented.	
1995		
1996		
1997		Implementation of Public Notice No. 60, detailing mandatory criteria for automotive investments, including local content requirements.
1998		Dispute cases DS146 and DS175 brought to the WTO.
1999		
2000		
2001	WTO accession (November 2001) and elimination of LCRs and other prohibited TRIMs.	Elimination of LCRs and other prohibited TRIMs
2002		New Automotive Policy: 100% equity permitted for automotive assembler and parts supply; incentives for small cars; reductions of tariffs for inputs (e.g. steel); establishment of Core Group on Automotive Research and Development (CAR).
2003		
2004	New Automotive Industrial Policy formalises technology transfer and research and development performance requirements.	
2005	Reductions in tariffs: to 25% for finished vehicles and 10% for parts.	
2006	Dispute cases DS339, DS340 and DS342, relating to the treatment of imported kits as complete vehicles, brought to the WTO.	Automotive Mission Plan continues government's emphasis on small cars and automotive.
2007		
2008		
2009		
2010	100% foreign ownership permitted in auto parts sector (assembly still restricted to 50%).	Free trade agreement with ASEAN.

Source: collated by the author.

Appendix 28: Panel unit root tests (Fisher-type Augmented Dickey-Fuller tests), with and without linear time trends

Variable	*p* value, unit root test without linear trend	*p* value, unit root test with linear trend
Log local content	1.0000	0.0008
Log local content as a proportion of apparent consumption	0.9997	0.0079
Log output	1.0000	0.0586
Log output specialisation index	0.9982	0.8016
Log exports	0.0930	0.0001
Log export specialisation (RCA) index	0.0000	0.0000
Log imports	0.9979	0.0050
Log imports as a proportion of GDP	0.0000	0.0000
Trade balance as a percentage of GDP	0.0000	0.0000
Exports as a proportion of trade	0.0000	0.0000
Log vehicle production per capita	0.9790	0.0450
Log automotive output as a proportion of GDP	0.7176	0.2522
Interpolated CIP index	0.9992	-

Note: Choi (2001) suggests that the inverse normal Z statistic offers the best trade-off between size and power; this is the statistic for which p values are reported here.